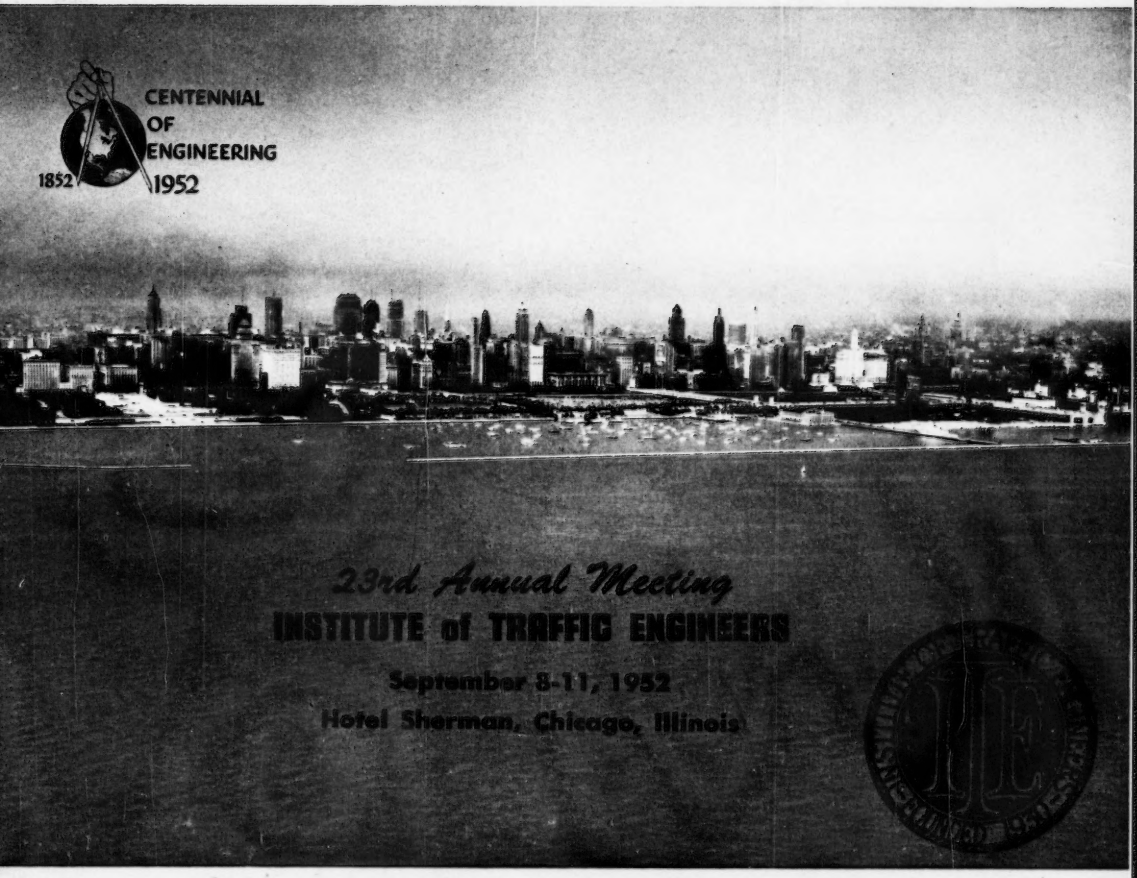
SEPTEMBER, 1952

Traffic Engineering

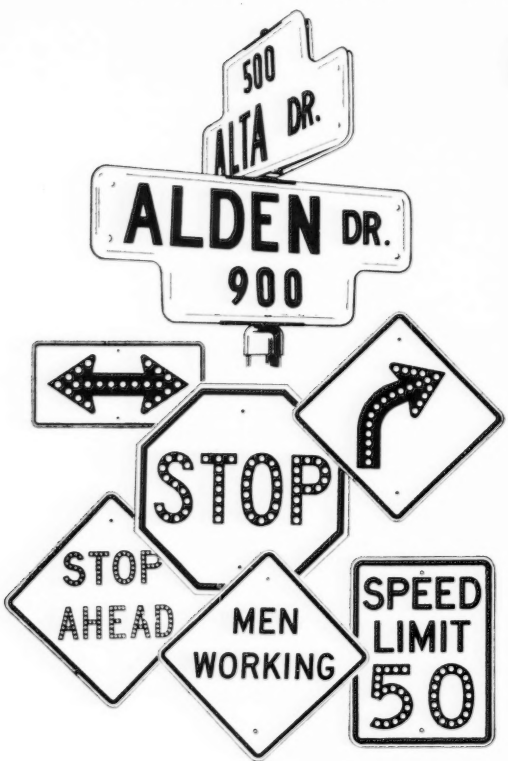


Skyline of Chicago—Host City 23rd Annual Meeting ITE

Photo Courtesy Chicago Aerial Survey Co.

CONVENTION ISSUE

TO EFFECTIVE TRAFFIC CONTROL.....



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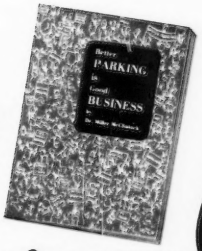

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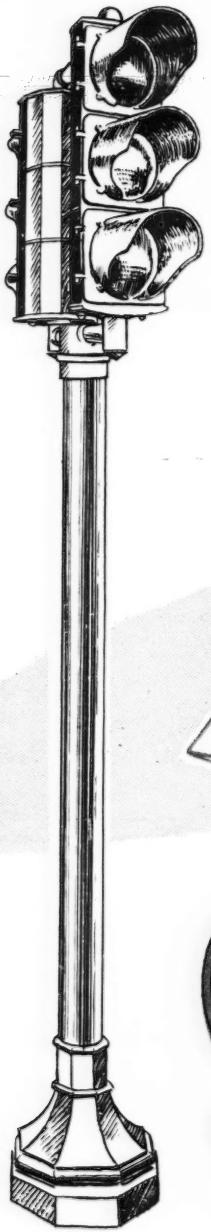

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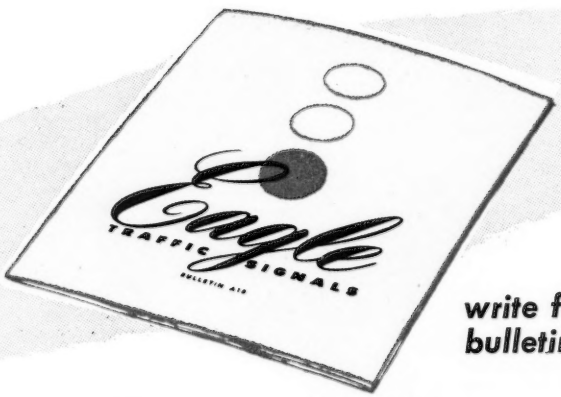

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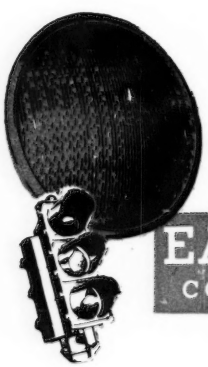

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Traffic Engineering

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

VOLUME XXII | SEPTEMBER, 1952 | NUMBER 12

COVER: Aerial view of "Loop" section, heart of Chicago, nation's second largest city, looking directly west. Lake Shore Drive runs just beyond shore line on near side of park. World famed Michigan Boulevard lies on far side of park at near side of line of buildings. Small-boat harbor in foreground; mouth of Chicago River extreme right; one of municipal parking lots in Grant Park is visible in exact center between Shore Drive and Michigan Boulevard. This superb picture was taken by the Chicago Aerial Survey Company.

Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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Frankly Speaking

THE TIME of the ITE Annual Meeting has rolled around once more. Twenty-one such meetings have been recorded in the annals since the original organizational meeting of 30 charter members was held in New York in January of 1931. Thus, the Institute whose faithful are now gathering to witness the 23rd Annual Meeting, has within the year marked the completion of its 21st year of existence, a milestone that is universally recognized as symbolizing the coming of age of an adult. Indeed, the 22-fold increase in membership and the expected Annual Meeting attendance comprising one-sixtieth of the largest convocation of engineers the world has ever seen, is living testimony that the Institute has really come of age.

But with maturity comes new responsibilities to the profession it represents. No longer is it sufficient to merely measure, decry and bemoan the manifold inefficiencies of highway transport evidenced by the rising tide of congestion and strangulation that is inexorably engulfing our streets and highways today; or to condone the popular short term thinking by the approval of the hackneyed temporary expedients that provide measurable relief but briefly at best. New thinking is going to be necessary to cut through the prejudices of American concepts with respect to the rights of the property owner to light, air, and use of the street system; multi-laned, multi-tiered single use streets must become the ordinary order of the day.

Musing upon these things recently, we began to wonder about the purpose of annual conventions. In the United States there are more than 2000 organizations which hold yearly conventions, conferences or meetings, each attended by more than 100 persons. Does the typically American "convention" comprised as it is of hot air, hoopla, hangovers and chicken-green peas-mashed potatoes banquet, serve any real purpose or accomplish any real good, we wondered. And then recognizing the basic principle which has governed the real purpose of every ITE meeting; a principle that when applied by any of the other 2000 organizations accomplishes similar results—we found our answer.

The annual ITE meeting is an outgrowth of a principle that is as old as American civilization—a principle first practiced by the Pilgrims and perpetuated to this day in New England's "Town Meetings." The exchange of ideas—*making public good information for the commonweal.* In the case of the Institute the exchange of information has been the means by which the respect of this motorized nation has been won for the traffic engineer, and by which a new science has been created within the short span of a single generation. How else could the exchange of information so vital to the building of a new profession, have been better accomplished than by the medium of the technical sessions of the 22 annual meetings of the Institute? Almost every traffic engineering principle now authoritatively recognized and practiced throughout the nation found its first printing in the annual ITE meeting *Proceedings.*

A review of the 22 *Proceedings* is to review the history of the growth of a new profession. Here is a record of the deeds of practical men in developing, testing and proving techniques applicable in the birth and nurture of a new scientific structure. These pioneers recognized the need, visualized the solution, and best of all, recorded their hard gained experience in the *Proceedings* that all who followed might be taught with profit.

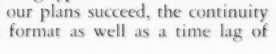
Yes, the Institute's Annual Meeting does serve a most serious and worthy purpose, and much for the good not only of the profession, but for the all-important American motorist is the net result.

* * * * * *

Which brings up another point. The technical session papers of all preceding meetings have been preserved in the *Proceedings.* Rising publication costs coupled with a declining ratio between paid and free distribution because of greatly enlarged membership have for several years past affected the Institute's financial structure so adversely, that early this year the Board of Direction was forced to reluctantly order suspension of the publication of 1952 papers. The Local Arrangements Committee was requested to notify all program participants accordingly. During the coming months TRAFFIC ENGINEERING will publish the papers, and arrangements will be attempted to preserve the printing type so that a limited number compilation of reprints may be run off prior to the next annual meeting in Buffalo. If our plans succeed, the continuity of the annual *Proceedings* will be maintained, although there will have to be a change in format as well as a time lag of nearly 12 months.

* * * * * *

The Officers, Directors, and Headquarters staff of the Institute wish to take this opportunity of thanking the Midwest ITE Section's Local Arrangements Committee under the able chairmanship of Mr. Leslie J. Sorenson for all of the hard work and fine planning which will make the 23rd Anual Meeting successful; the program participants who are contributing their worthwhile papers; the generous contributors whose names appear elsewhere in this issue, for making possible this meeting; and the advertisers and authors who have made this *Convention Issue* of TRAFFIC ENGINEERING possible.



Executive Secretary

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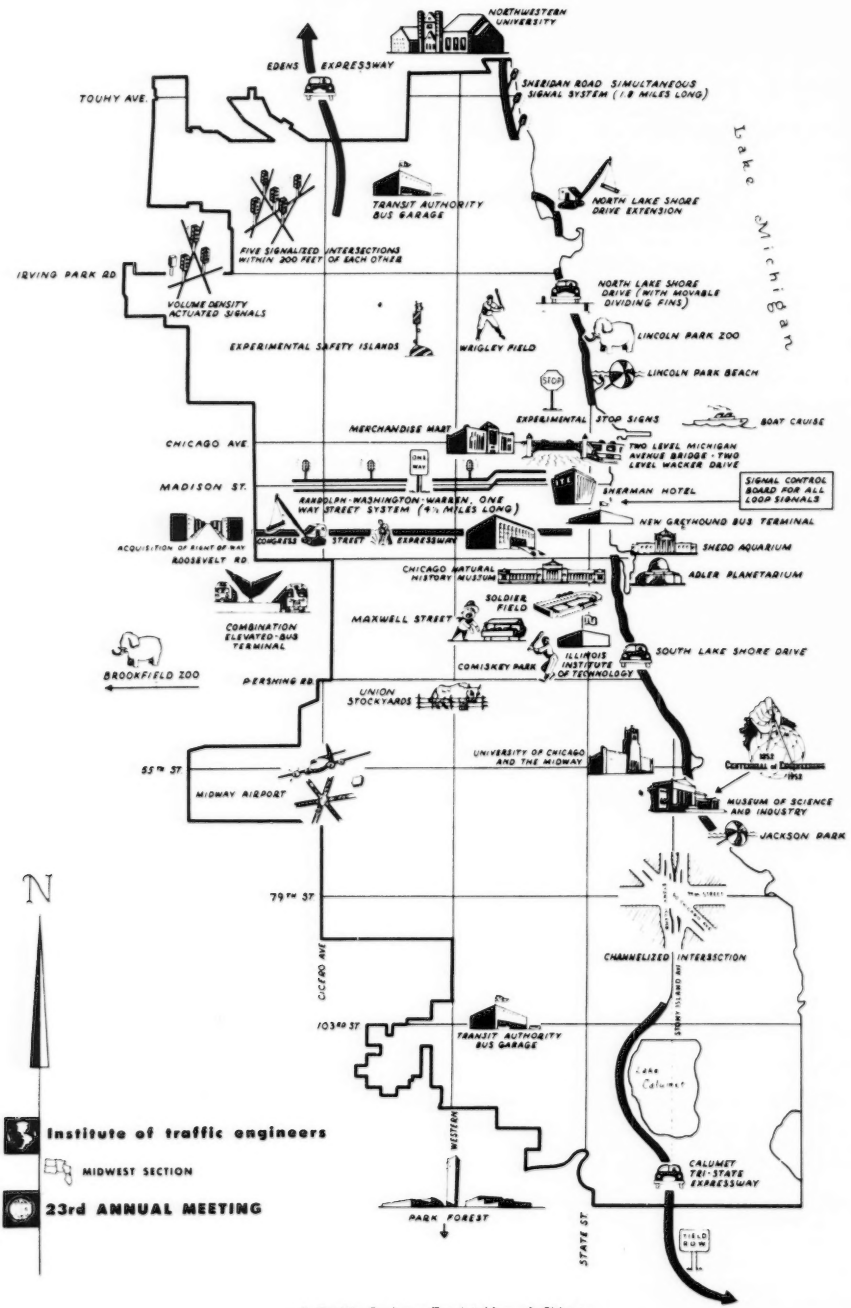

A Traffic Engineer Tourist Map of Chicago.

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23rd Annual Meeting Institute of Traffic Engineers

-:- PROGRAM :-:

• SUNDAY, SEPTEMBER 7

2:00 P.M.—Meeting of Board of Direction

2:00 to 5:30 P.M.—Registration
(Registration fee for ITE members—$2.00)

• MONDAY, SEPTEMBER 8

9:00 A.M.—Registration

9:00 A.M.—ITE Administrative Division and Technical Division Committee Meetings

Noon—Crystal Room
Convention Luncheon—
President Nathan Cherniack, Presiding

2:00 P.M.—Crystal Room
Annual ITE Business Meeting—
President Nathan Cherniack, Presiding
Committee Reports

• TUESDAY, SEPTEMBER 9

8:00 A.M.—Louis XVI Room
Biscuit Banter Breakfast
(Admittance by ticket only)

9:30 A.M.—Louis XVI Room
General Opening and First Technical Session.
Welcome to delegates, reports and announcements.

11:00 A.M.—Higher Standards in Traffic Engineering
A panel discussion by ITE Committee on Philosophy and Principles of Traffic Engineering.

Afternoon—Louis XVI Room
Second Technical Session
Theme—The Economics of Traffic Planning

1:30 P.M.—The Needs in Urban Street Transportation
Speaker to be announced

2:30 P.M.—Costs of Traffic Inefficiency
Speaker to be announced

3:30 P.M.—Financing Street Transportation Plans
A panel discussion directed by D. Grant Mickle, Director, Traffic Engineering Division, Automotive Safety Foundation

• WEDNESDAY, SEPTEMBER 10

Morning—Louis XVI Room
Third Technical Session
Theme—Developing the Traffic Plan

9:00 A.M.—City Planning Aspects of Traffic Engineering
Ladislas Segoe, Ladislas Segoe and Associates

10:00 A.M.—The Role of Expressways in Relieving Urban Traffic Congestion
Joseph Barnett, Chief, Urban Highway Branch, U. S. Bureau of Public Roads

11:00 A.M.—A Comprehensive City Traffic Plan
Lloyd M. Braff, City Traffic Engineer, Dallas, Texas

Noon—Past Presidents' Luncheon
(Attendance restricted to past presidents and guests)

Afternoon—Louis XVI Room
Fourth Technical Session
Theme—Selling the Traffic Plan

1:30 P.M.—Effective Speaking for Engineers
Dr. Karl F. Robinson, Chairman of Speech Education, School of Speech, Northwestern University

2:30 P.M.—How to Prepare Professional Reports
Dr. Daniel R. Lang, Professor of Business Writing, School of Commerce, Northwestern University

Evening—Bal Tabarin (banquet room—sixth floor)

7:00 P.M.—Annual ITE Banquet
Principal Speaker: Dr. J. O. Christianson, Supt. of the University of Minnesota School of Agriculture
(Attendance by ticket only)

• THURSDAY, SEPTEMBER 11

Morning—Louis XVI Room
Fifth Technical Session
Theme—Traffic Engineering Techniques

9:00 A.M.—Sufficiency Ratings for Urban Streets
A panel discussion directed by Gordon Gravelle, Traffic Engineer, Automotive Safety Foundation

10:00 A.M.—One-Way Streets
A panel discussion directed by George W. Howie, City Traffic Engineer, Cincinnati, Ohio

11:00 A.M.—The Parking Problem in Residential Areas
Wilbert F. Watkins, Director of Traffic Engineering, Louisville, Kentucky

Afternoon—Private car transportation and guides will be provided for field inspection trips to any engineering projects in Chicago requested by delegates. Further announcements will be made during meeting.

OTHER EVENTS

• TUESDAY, SEPTEMBER 9

Noon—West Room
Yale Bureau of Highway Traffic Alumni Luncheon
(Attendance limited to Alumni and guests)

Headquarters Room—Parlors L, M, N and O open each evening from 5:00 P.M. and Thursday from noon to 4:00 P.M.—Informal conferences and social activities.

ITE Program For Ladies

Mrs. Ralph F. Michel
Chairwoman of Arrangements

- **SUNDAY, SEPTEMBER 7**
  4:00 to 5:30 P.M.—Ladies headquarters open
- **MONDAY, SEPTEMBER 8**
  9:00 to 11:00 A.M.—Ladies headquarters open
  11:00 A.M.—Get-Acquainted Brunch, Louis XVI Room (No charge)
  1:00 P.M.—North Shore Tour
  4:00 P.M.—Cocktail Party, Tam O'Shanter Country Club (No charge)
- **TUESDAY, SEPTEMBER 9**
  9:00 A.M. to 12:00 Noon—Ladies headquarters open
  12:30 P.M.—Luncheon, Lake Shore Club (no charge)
  2:00 P.M.—South Shore Tour to Museum of Science and Industry
- **WEDNESDAY, SEPTEMBER 10**
  9:00 A.M. to 1:00 P.M.—Ladies headquarters open (Shopping Day)
  6:00 P.M. to 6:45 P.M.—Reception
  7:00 P.M.—Annual Banquet (Corsages will be furnished)

RADIO AND TV TICKETS, limited number available for Don McNeill's Breakfast Club; Tommy Bartlett's Welcome Traveler, and Francois Pope Creative Cookery.

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23rd Annual Meeting of the
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Hotel Sherman, September 8-11
will be the best ever.

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the installation and maintenance of
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Centennial of Engineering-1952
Convocation of Engineers

Section Five—Symposium on Transportation

:-: **Program** :-:

Monday and Tuesday, September 8 and 9
Conrad Hilton Hotel Ballroom

Chairman, CHARLES F. KETTERING
Research Consultant, General Motors Corporation

1. Automobiles
   Christy Borth,
   Automobile Manufacturers Association
2. Ships
   Admiral Harold G. Bowen, Executive Director
   Thomas Alva Edison Foundation, Inc.
3. Trailers
   V. M. Drew, Director of Research,
   Fruehauf Trailer Company
4. Aircraft
   O. T. Kreusser,
   Allison Division of General Motors
5. The Growth and Status of Highway Transport
   B. B. Bachman, Vice-President,
   Autocar Company
6. Railroads
   Fred G. Gurley, President,
   Atchison, Topeka and Santa Fe Railroad
7. Buses
   Leon F. Banigan, Editor,
   Bus Transportation
8. Farm Tractors (to be announced)
9. Air Frame
   C. S. (Casey) Jones, President,
   Academy of Aeronautics,
   LaGuardia Airport

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Handbook

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at the
ITE Registration Desk

$6.00 per copy

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Centennial of Engineering - 1952
Convocation of Engineers - Sept. 3 - 13

A Schedule of Place and Dates of Meetings of 27 of the Participating Engineering Societies

Society	Location	T 2	W 3	T 4	F 5	S 6	S 7	M 8	T 9	W 10	T 11	F 12	S 13
American Concrete Institute	Conrad Hilton								X	X	X	X	
American Institute of Chemical Engineering	Palmer House									X	X	X	X
American Institute of Consulting Engineers	University Club							X					
American Institute of Electrical Engineers	Congress									X	X	X	
American Institute of Mining and Metallurgical Engineers	Palmer House		X	X	X	X	X						
American Iron and Steel Institute	Palmer House										X		
American Society for Engineering Education	W.S.E. Sheraton		X	X	X	X							
American Society of Agriculture Engineers	LaSalle							X	X				
American Society of Civil Engineers	Conrad Hilton LaSalle (3-4)		X	X	X	X	X	X	X	X	X	X	X
American Society of Lubrication Engineers	Sherman							X	X				
American Society of Mechanical Engineers	Sheraton							X	X	X	X		
American Society for Testing Materials	Sherman									X	X		
American Society of Tool Engineers	Furniture Mart									X			
American Standards Association	Museum of Science and Industry							X	X	X			
Association of Consulting Managing Engineers	Sheraton				X								
Engineers Council for Professional Development	Sheraton				X	X							
Engineering Institute of Canada	Conrad Hilton				X								
Illuminating Engineering Society	Edgewater Beach							X	X	X	X	X	
Industrial Management Society											X		
Institute of Radio Engineers												X	
Institute of Traffic Engineers	**Sherman**							X	X	X	X		
International Commission on Irrigation and Drainage	Conrad Hilton							X					
International Commission on Large Dams	Conrad Hilton				X								
Society for Advancement of Management	Illinois Institute of Technology										X	X	
Society of Automotive Engineers	Knickerbocker			X									
Society of Naval Architects and Marine Engineers	Sherman				X								
World Power Conference	Drake			X									

G. DONALD KENNEDY (Mem., ITE), *Vice-President, Portland Cement Association:* Chairman of the Technical Program, says; "Never before, anywhere in the world, has there been as large a meeting of engineers as will be held in Chicago during the Centennial of Engineering. No technical program as broad in scope has ever been put together."

HOWARD F. PECKWORTH, *Managing Director of the American Concrete Pipe Association:* Chairman of Arrangements, says; "Attendance at some of the individual technical sessions will exceed 500, and on some days a dozen important meetings will be running simultaneously. From September 3 to 13, Chicago will definitely be capital of the engineering world.

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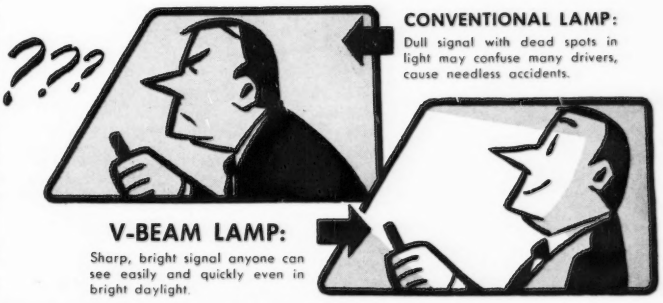

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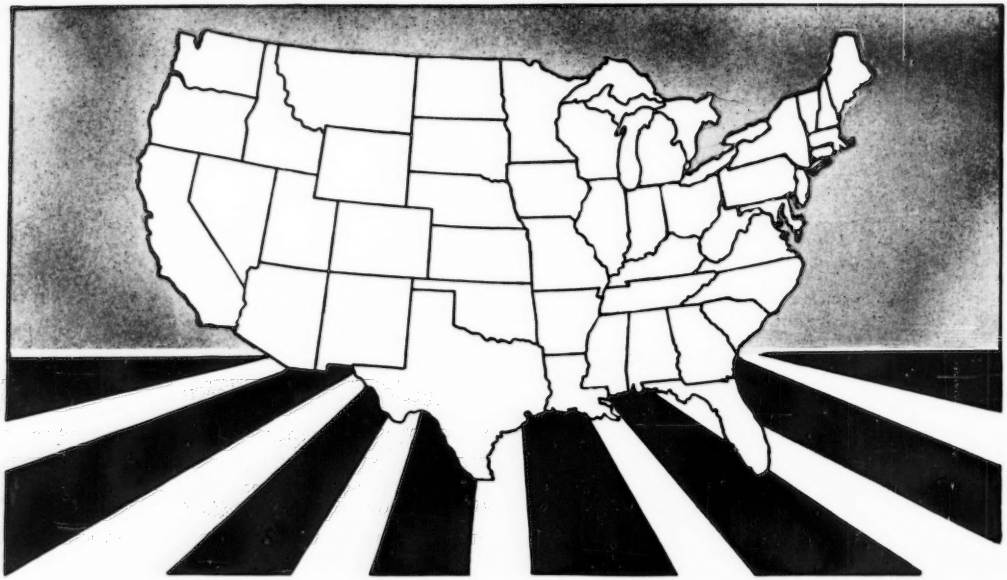

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PRISMO SAFETY CORPORATION

HUNTINGDON, PENNA.

The Chicago Bureau of Street Traffic

By William R. Marston (Mem., ITE)
Deputy City Traffic Engineer, City of Chicago, Illinois

CHICAGO, like all other large cities, is confronted with a traffic problem which is based on streets not designed for present day traffic volumes and traffic speeds far above the ability of the streets to handle them with safety and like many other large cities, the impact of this problem had to be felt for some time before concrete steps were taken to solve it.

Mayor Kennelly provided the leadership and spearheaded the movement to develop a planned program to solve the problem by putting the three E's of traffic safety to work. Traffic engineering came in for a position, comparable with its importance in this three-pronged attack on the traffic problem.

The first step was to organize the municipal government to deal administratively with the problem. A sound basic law was provided and traffic engineering was given bureau status. It sounds simple but it took herculean efforts by all concerned to accomplish these necessary preliminaries.

Chicago has a modern traffic code as a result of this effort—a sound basic law, patterned after the Uniform Vehicle Code and Model Traffic Ordinance. The police department was revamped and organized to cope with the metropolitan traffic problem and the traffic engineering department reorganized.

By January 1, 1950, the Bureau of Street Traffic began to function. New and modern quarters were established in the City Hall, modern office equipment was installed, and a search begun for additional engineers competent enough to meet the standards set up for the job ahead.

Bureau Has Full Authority

The Bureau was organized to handle all phases of traffic engineering even to long-range planning—something which Chicago had, heretofore, been unable to attempt because of lack of staff and facilities.

The organizational set-up follows established principles. Four divisions have been organized to deal with traffic engineering functions—shop, planning, operations and engineering. An administrative section handles all routine matters, such as the maintenance of work files and accident records.

Other sections, organized within the divisions named, include analytical, design, signal, and construction, so that all problems common to traffic engineering can be routed to a specialized group for handling.

The present staff does not permit more than a token force in some of these sections but the main organizational plan is being tenaciously adhered to until increased budget permits an expansion of the present skeleton force.

Despite the handicap imposed by this limitation of manpower, Chicago's traffic engineering staff handled more than 6,000 field surveys during 1950.

The tremendous volume of work necessary to keep pace with the growing traffic demands is best illustrated by the fact that during 1950 nearly 128,000 traffic warning or control signs were installed or replaced and 11,427 stop signs were installed or replaced and approximately 29,000 miles of lane lines, crosswalks and so forth were painted.

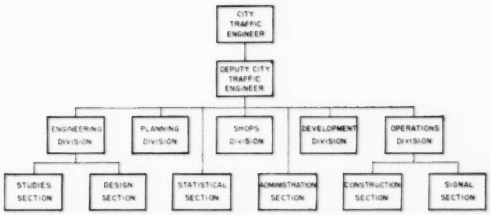


Fig. 1.
Organization Chart.

26,000 Intersections

Chicago's 212 square miles, 3,700 miles of street, 2,000 miles of alleys and 26,000 street intersections require a vast amount of attention from the traffic engineers. This entails a volume of field work and correspondence, and under the new organization a special filing system was set up to handle it.

Every complaint or suggestion whether received verbally or via correspondence is carefully catalogued. A numbered project card is prepared for each of them. A master card in the Administrative Section shows the exact status of each survey at any time. Another card of a different color automatically goes to the field engineers for handling, and eventually finds its way back to the master file.

When this card does arrive at the master file, it carries a substantial amount of literature appended to it. For all sign installation orders, engineering reports, accident analysis, traffic data, and letters in answer to the original complaint or suggestion gravitate to this card to complete the record.

Field survey work is handled by a group of engineers in the Engineering Division. Problems encountered by the staff of this division usually involve accident data or traffic counts and sometimes both. The needed information is available on request from the Analytical and Statistical Section.

Due to the revamping of accident files and traffic counting procedures, complete accident data on any location can be obtained in a few minutes and the traffic count within a few days. Accident reports from the police department are filed manually. In most cases the engineer can make a better analysis if he has the original accident report to study.

Three Mobile Special Survey Units

In addition to a staff of regular traffic checkers who handle routine traffic counts for traffic signal work, we now have three specially equipped mobile units. Two of these units are light panel trucks, equipped with automatic traffic counters. Each unit is operated by a crew of eight men and two chauffeurs with four men and one chauffeur on each of

(Continued on page 447)

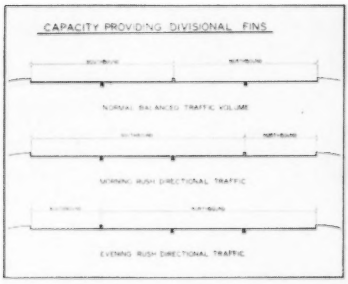
Chicago's Urban Highways

By R. G. Fencl (Mem., ITE)

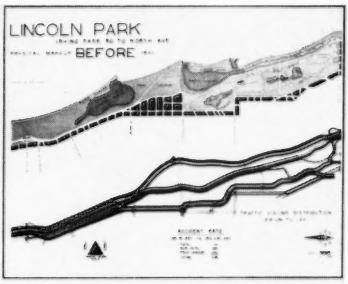
Traffic Engineer, Chicago Park District

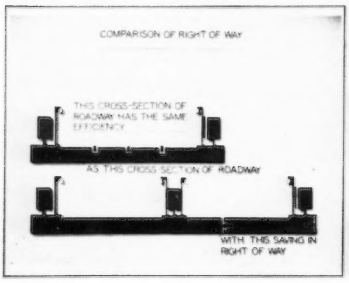
THERE HAS long been a distinction made by traffic engineers between the two fundamentally different types of traffic thoroughfares—rural highways and urban streets. Each of these carry traffic under their own characteristics, and their capacities and accident histories clearly distinguish them as separate entities in the field of traffic engineering. The Chicago Park District, a separate governing agency within the corporate limits of the City of Chicago, has operated and maintained a system of roadways which are unique because they fall in neither of these categories. This system of roadways, the boulevards and drives of the Chicago Park District, might be most aptly termed "urban highways" by the traffic engineer because they consist entirely of through arteries providing strategic access to the traffic-attracting locations in the city. On this system of roadways segregation of traffic exists to a considerable extent, with commercial vehicles and some other type of non-private traffic prohibited and commercial deliveries restricted and curtailed on the roadways. Motorists on Chicago Park District boulevards and drives enjoy the scenic comforts and efficiency of higher-speed, more continuous movements typical of highway traffic and yet vie with great volumes of traffic in densely populated areas typical of urban street traffic. This system of roadways stands as a monument to the far-sightedness and civic-mindedness of the pioneers who first planned a park system for the City of Chicago.

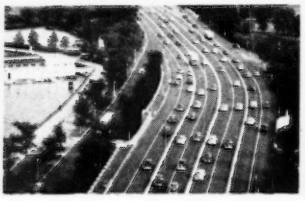
In 1869 the legislature of the State of Illinois created the South, West, and Lincoln Park Districts within the City of Chicago, each district being a separate entity and operating on tax funds received from their respective jurisdictional limits. It was at this time that the movement was started to "frame Chicago with a garden of parks and connectiag boulevards." These districts had no authority to extend their area activities and in 1895 the legislature adopted an act permitting local park districts to be formed in areas outside the limits of the original three districts. As a result of this act, by 1930 nineteen additional, but smaller, districts were functioning within the City. Each of the twenty-two districts had its own taxing powers and was governed by an elective board of commissioners. After years of effort on the part of civic leaders, the legislature enacted the Park Consolidation Act in 1933 which became effective in the fall of 1934. The twenty-two former park districts passed out of existence and all their powers and functions were vested in the Chicago Park District, which was empowered by law to control,


CAPACITY PROVIDING DIVISIONAL FINS
NORMAL BALANCED TRAFFIC VOLUME
MORNING RUSH DIRECTIONAL TRAFFIC
EVENING RUSH DIRECTIONAL TRAFFIC

Forty-one per cent of the entire private passenger automobile traffic entering the Central Business District of Chicago comes from the north and uses Lincoln Park facilities. The bulk of this traffic uses the North Lake Shore Drive system which imposes a heavy one-way directional problem during the morning and evening rush periods. To accommodate these heavy directional traffic flows during the peak periods, a 170 foot wide roadway width would be necessary using conventional roadway design. However, the same capacity is provided with a 100 foot roadway by the use of the capacity providing divisional fins which consist of 3 parallel lines of fins running longitudinally in the roadway and arranged so that by raising and lowering of each parallel row, by means of hydraulic jacks, the roadway may be separated into needed combinations.




COMPARISON OF RIGHT OF WAY
THIS CROSS-SECTION OF ROADWAY HAS THE SAME EFFICIENCY
AS THIS CROSS SECTION OF ROADWAY
WITH THIS SAVING IN RIGHT OF WAY



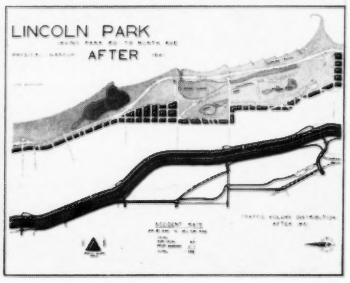


Fig. 1

Lake Shore Drive retractable divisional fin section. Eight lanes do work of twelve.

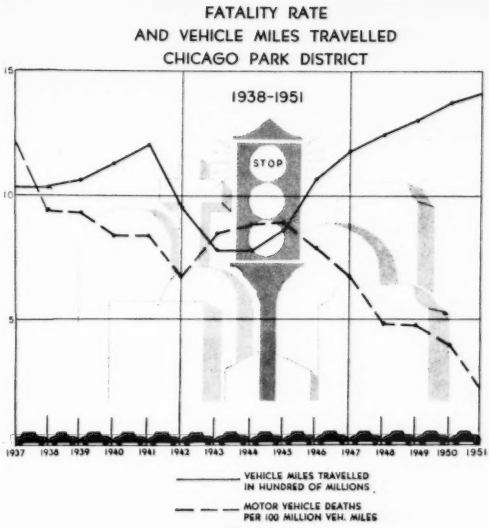

FATALITY RATE
AND VEHICLE MILES TRAVELLED
CHICAGO PARK DISTRICT
1938-1951
STOP
15
10
5
1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951
VEHICLE MILES TRAVELLED IN HUNDRED OF MILLIONS
MOTOR VEHICLE DEATHS PER 100 MILLION VEH. MILES

Fig. 2
Fatal accidents drop despite increasing vehicle miles.

manage and govern all parks, driveways and boulevards formerly under control of the twenty-two districts.

Authority of Park District

The Chicago Park District was empowered to enact and enforce ordinances and maintain, separate from the City of Chicago, its own police force, its Traffic Engineering Section, Engineering Division and other divisions to perform all the other duties required in the operation of the 135 parks, 28 miles of Lake Michigan shoreline and 205 miles of boulevards and park driveways including the famous Lake Shore Drive, more commonly known as the "Outer Drive."

Upon completion of the consolidation of the park districts, the Traffic Section was established under the jurisdiction and control of the Chief Engineer, headed by the Traffic Engineer, who, as outlined in the Code of the Chicago Park District, "shall supervise the routing of traffic; the study and development of traffic control devices, traffic signal systems and other means of traffic control; the proper placement of traffic control devices; the planning of parking and of directing of vehicles during emergencies and special events; the organization of traffic safety programs; the preparation of traffic bulletins; the study of traffic and its attendant conditions and the development of plans to improve traffic facilities and to minimize traffic accidents; and shall perform such other similar and related work as assigned and required by the Chief Engineer."

The Traffic Engineer found a chaotic condition in existence at the consolidation of the park districts. It was necessary to repeal a mass of uncoordinated and obsolete traffic ordinances and to develop one ordinance along the lines of a Uniform Traffic Code. A proper accident report had to be devised for use by the Police Division and their aid enlisted in the proper procedure in making out the report with machinery established to utilize the information on the report to its fullest extent; the mass of regulatory signs in existence had to be standardized—one district alone had 198 different types of signs; traffic signals and progressive timing and programming systems had to be coordinated and cycle lengths standardized; plans had to be made for permanent improvement of roadways for safer and more efficient movement of traffic and the handling of traffic while construction was under way; and machinery set up to handle the myriad traffic control safeguards necessary throughout the District.

To accomplish this the Traffic Section was divided into four units which were designated as the Planning, Accident Prevention, Service and Construction, and Maintenance Sub-Sections.

Boulevards and Drives Popular

The success of this organization has been proven by the continuous popularity of the park network of boulevards and drives. Since their inception, the Chicago Park District roadways have been the most popular thoroughfares in the City. At present, although the Park boulevards and drives comprise but 4% of the total city street mileage, they carry over 17% of the City's traffic. Over 65% of the motorists entering and leaving Chicago's great Central Business District use Chicago Park District roadways, while the Park system comprises only 23% of the available roadway width in this area. Volumes as high as 12,000 cars per hour pass a given point on the most heavily used roadways of the system during peak rush periods. *These volumes are unexceeded by any other roadways of the world.* The amount of annual travel on Park District boulevards and drives is now approaching 1.5 billion vehicle miles and has shown a consistent growth except for the curtailed driving period during the war years.

The demonstrated heavy preference by the motorist for the "urban highway" facilities of the Chicago Park District has continuously presented the traffic engineer with a challenge to accommodate the greatly rising number of vehicles in the City to the limited facilities of the fixed plant of roadway and right of ways.

All of the basic traffic engineering data developed throughout the country has been aimed to fit either of the two basic types of roadways, the rural highways or the urban streets. Since the traffic characteristics of the urban highways of the Chicago Park District fit in neither of these categories completely, all of the Park District traffic planning could only be based on interpretations and modifications of previous traffic concepts or on original engineering studies of the Park roadways themselves.

The bulk of the basic data used in the Chicago Park District planning and designing of original traffic measures to accommodate the increasing traffic volumes, while preserving the special boulevard characteristics came from carefully conceived surveys and studies.

As early as 1936 studies were being made of vehicular headways at signalized intersections and on limited-access freeways. Practical capacity expectations were determined for various type roadways and traffic counts were taken block by block throughout the boulevard systems to locate capacity inefficiencies. Formulae were developed for roadway, lane and ramp widths, and warrants were established for traffic signals and stop signs. The concept of analyzing specific locations was broadened into studies of entire lengths of trafficways, locating capacity control points of long integral stretches of roadway.

New roadway construction was carefully planned from the formulated traffic concepts and the work of the construction engineer was coordinated with the work of the traffic engineer. Plans were projected far into the future to circumvent the possibility of designing soon-to-be inadequate roads. However, much of the boulevard system was firmly fixed and the search was directed to making the utmost of the existing facilities.

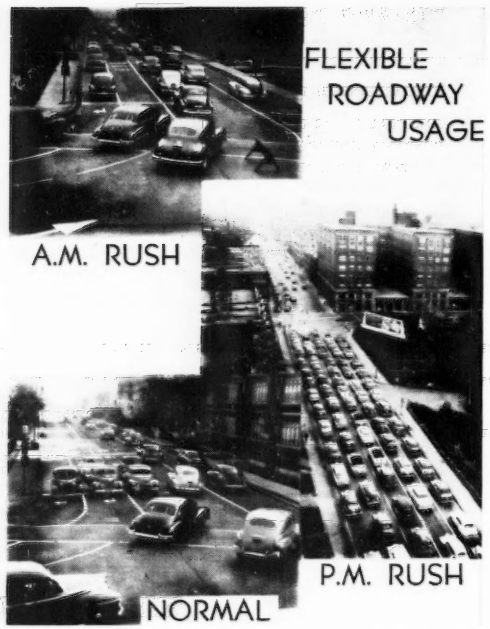


Fig. 3
Park District uses reversible lanes.

Reversible Lane Use in 1935

One of the many innovations in the search for capacity was the introduction of reversible lane operations in the City of Chicago in 1935. On multi-lane facilities where an unbalance of directional flow of traffic was found for various times of the day, the number of lanes were split directionally in the same proportion as the unbalance in directional flow of traffic. Thus certain lanes were reversed directionally in daily traffic operations. The use of the reversible lane principle has led to many innovations in provisional markings and signs.

On September 1st, 1942, the completion of the Lincoln Park development marked the introduction of the mechanical traffic divider, the ultimate refinement of the reversible lane principle.

The North and South expressway in Lincoln Park had shown a demand for six traffic lanes in the Southbound direction and two traffic lanes in the northbound direction during the morning rush hour. During the evening rush hour, the lane requirements were the same except the major and minor movements were reversed in direction. At other times of the day four lanes in each direction were adequate to meet capacity demands. Thus, the total lane requirements for any period of the day were eight lanes, but six lanes were necessary in each direction during 24 hours of traffic operation. With the conventional design of a fixed centerline, 12 lanes would have been necessary to accommodate the traffic requirements. Reversible lane usage utilized in its highest form of efficiency by means of mechanical dividers accomplished the task of accommodating the seemingly 12 lanes of traffic on eight lanes of traffic roadway. The resulting savings in construction and other costs were tremendous and the precious park space of a teaming city was conserved.

The mechanical traffic dividers consist of three parallel lines of fins running longitudinally in the roadway and arranged so that by raising and lowering the lines of fins, the roadway can be arranged in several combinations of traffic lanes, providing two, four or six lanes in either direction. The fins are moved by hydraulic power and the raising and lowering is controlled by the operation of switches from control boxes which are located at the two extremities of the system.

Modern Signal Programs

Another engineering tool used to preserve the highway aspect of the Park District thoroughfares has been the strict adherence to modern signalization programs. Originally located in outlying areas, the Park system of roadways soon felt the rising tide of growth in population and vehicle registration. With the encroachment of rising volumes on cross street traffic imposing the need for signalization of more and more intersections, the search for continued fluidity of movement necessitated the development of special signal progressions and phases to provide flexibility in traffic movement. As early as 1935 periodic regulations prohibiting certain traffic movements and parking during peak hours of traffic activity but preserving the mobility of traffic during normal hours had been established. The success of periodic regulations in reversible lane usage and flexible signal control was repeated in other functions of traffic control and this principle was employed in designing parking regulations and special channelizations such as optional lanes for peak vehicular activity. Channelization and periodic regulation have been important tools of engineering used to provide flexibility to the Park network of roadways necessary to keep pace with growth of population and automobile usage and to preserve the desired characteristics of Park boulevards.

Coupled with the successful endeavor to maintain capacity on our urban highways has been a constant vigil for safety. Accident prevention has been a by word in all of the engineering programs of the Chicago Park District. Judicial use of accurate detailed information on all accidents, compiled and tabulated by mechanical tabulators has led to marked success in accident prevention. The year of 1952 showed a decrease of 64% from the high recorded in 1937 in the fatality rate for the Chicago Park District. The lifesaving decrease in the accident rates has been a consistent one throughout the years, paralleling the remedial measures and engineering improvements introduced by the Traffic Section.

The records of the Chicago Park District show a constant gain in the efficiency and safety of moving traffic. The popularity of the urban highways is a great acclaim for their planners and designers. Their primary purpose of providing scenic routes to the parks and points of recreation has been amplified by hundreds of thousands of motorists who use the roadways to reach points of their economic interest, but progressive engineering has maintained the roadways' recreational value.

Millions of people enjoy the recreational facilities of the Chicago Park District each year. The recreation seekers are given every consideration in the comprehensive traffic program. Large scale activities attracting crowds in the neighborhood of 100,000 such as those staged at Soldier Field, Chicago's great outdoor lake front amphitheater, are carefully planned in advance. Preceding all special events of this magnitude, the Traffic Engineer meets with representatives of the various participating agencies, such as the police,

(Continued on page 472)

Chicago's City Expressway Plan

By V. E. Gunlock

Commissioner, Department of Subways and Superhighways, City of Chicago, Illinois

Twenty or thirty years ago Chicago spent many millions of dollars widening existing streets to provide additional traffic capacity. At that time no one realized that widening streets without provision for grade separations would cause terrific traffic congestion in later years. The importance of grade separated trafficways is becoming more and more a necessity due to the accelerating increase in the use of the motor vehicle.

A thorough study of the streets in the City of Chicago and of their ability to handle traffic indicated that Chicago should construct a Comprehensive System of Superhighways. The City Council adopted such a system in 1940. This system included the famous Outer Drive which had been built along the lake front from Foster Avenue on the north to 47th Street on the south, as well as Wacker Drive which had been constructed as a double deck street along the south branch of the Chicago River from Michigan Avenue to Lake Street. The official plan is shown in Figure 1.

A portion of this comprehensive system is included in a program to be completed by 1960. This includes all of the West and Northwest Routes, the Wacker Drive Extension, the Southwest Route and sections of North and South Routes.

An important feature of the superhighway system is that the financing, design and construction is participated in by the City of Chicago, Cook County, State of Illinois and the Federal Government.

Design Considerations

Some of the fundamental design features are:

1. All cross traffic, both pedestrian and vehicular, is to be eliminated by depressing the roadways or, in special locations, by elevating them.

2. Only important streets will be carried over the depressed section; all other streets will be cut off.

3. Main roadways will usually consist of four or more 12-ft. traffic lanes in each direction with a capacity of 1,500 vehicles per hour per lane.

4. Opposing streams of traffic will be separated by a median strip, usually 24 feet wide, but reduced to a 4-foot width on structures.

5. Maximum grade will be 4 per cent.

6. Design speed is 60 mph for main roadways.

7. Access will be by entrance and exit lanes at controlled locations only. Abutting property will have service drives at street level to connect with entrance and exit lanes.

8. Provisions will be made for use by mass transit vehicles. In the Congress Street Superhighway (West Route) the existing elevated structure will be removed and tracks of the new subway will be laid in median strip.

9. A continuous shoulder 10 ft. wide will be provided for disabled vehicles.

10. Unpaved parts of the right-of-way will be suitably landscaped.

11. Pavements will be 10-in. thick concrete on a granular base.

At the junction of the West, Northwest and South Routes near Congress Street and Halsted Street a complete interchange is planned. Here, to avoid any crossing of traffic lanes at grade it will be necessary to construct 39 structures in an area two blocks square. This interchange is further complicated by a subway portal where the subway tracks go into the tubes under the Chicago River to the east. This interchange, where two roads with a capacity of 6,000 vehicles per hour in each direction will cross, will be a busy place.

Wacker Drive, which is a double-decked inner distributor for the superhighway system is connected with the West Route at the east bank of the Chicago River by means of a half cloverleaf interchange which permits traffic only to and from the west.

Design Committee Functions

With respect to design, a Design Committee composed of representatives from each of the participating agencies, has been functioning to determine overall design policy. This is an extremely important group which makes final determination of all design characteristics of the superhighway system.

A Subcommittee of this group has been studying the traffic aspects of the system and have contributed immeasurably to the overall design pattern of the superhighway system.

By the use of all available data, the Traffic Subcommittee has determined the traffic demand on the superhighways, the location and number of overpass bridges, the width and arrangement of lanes on the overpass bridges and the proper location of access ramps for entrance and exit.

The work of this committee involved traffic counts on all streets that intersect the expressways, the use of the last O-D survey made in the City, the use of the Highway Capacity Manual of the Bureau of Public Roads, and required a determination of a factor that could be applied to the traffic in Chicago. The factor as determined by field survey was 1.4 which in effect means that Chicago driving characteristics make it possible to obtain 40% greater capacity when using the manual.

With regard to particular routes, the Traffic Subcommittee found that on the West Route Expressway it would be necessary to construct only two ramps at each of the intersecting streets that had overpass bridges. Four ramps would require more turning movements than could be accommodated on the existing streets.

On the West Route it was found that the location of some ramps required that additional lanes be provided for weaving sections. Such studies required major revisions in the original plans.

Northwest Route Posed Special Problems

The Northwest Route posed problems of a different nature due to the fact that it goes diagonally across the city. The Traffic Subcommittee, through its studies, determined the location of ramps on this route also and through their

Fig. 1

Chicago's comprehensive superhighway system plan.

studies determined that traffic originating west of the expressway should approach on the East-West streets and traffic originating north and east of the expressway should be served by the North-South streets. This arrangement eliminated many left turns. In all of their studies the Traffic Subcommittee attempted to place the ramps so that the existing street widths could be maintained and still properly feed the expressway.

On the Northwest Route the Traffic Subcommittee determined that to adequately handle the traffic that would desire to use the expressway during the peak hours it would be necessary to provide reversible lanes between the junction of the Eden's branch and the Erie Street branch. Under this system there would be four lanes in each direction at all times and two additional lanes, that will be separated by median strips from the main roadways, which will serve the traffic going to the Central Business District in the morning and from the Central Business District in the evening.

The Committee will proceed with similar studies on the other routes as quickly as time permits.

The experience we have had in Chicago indicates that a Traffic Committee should study expressways as quickly as an expressway is planned so that the location of cross streets, ramp connections and geometric arrangement of traffic lanes both on the expressways and overpasses may be decided early in the program.

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(Continued from page 441)

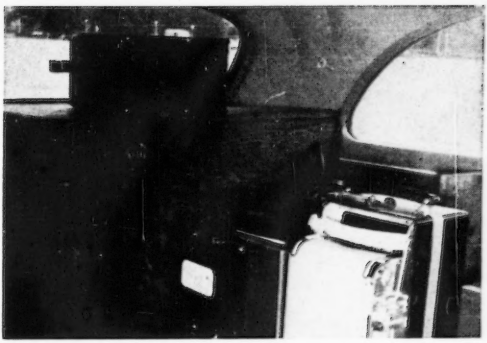

Fig. 2
Interior of mobile survey unit showing speed meter equipment.

two shifts so that continuous counts can be made between 7:00 A.M. and 7:00 P.M.

At the present time the traffic counting equipment consists of 21 automatic non-recording pressure type traffic counters and eight recording pressure type counters. Other equipment includes specially constructed tabulating equipment for use of the men on manual counts. The third mobile unit is a small standard sedan which is equipped with a radar speed meter, recording speedometer and a tape recorder. The crew of this unit in addition to operating this equipment also have a 35mm camera and take photographs of all locations where traffic counts are made.

The reorganization of traffic engineering permits the bureau to handle the assignment as it should be dealt with. Routine surveys are being handled more expeditiously, and an excellent beginning has been made on projects of great scope, such as analysis and correction of congested intersections, one-way street studies, studies of truck terminals, and other areawide items. Long-range planning for major thoroughfares has begun, as has the preliminary work on a proposed origin and destination survey.

When the Chicago City Council three years ago passed the ordinance completely revising the city's traffic code, traffic engineering was given that "big shot in the arm." The revised code provided for the establishment of the Bureau of Street Traffic (under the city Traffic Engineer), and empowered it to operate.

With this blueprint and sufficient staff to implement the authority implicit in the direction of the city council, traffic engineering will move forward in coordinated effort with enforcement and education—to play its important role in keeping Chicago's traffic moving with safety.

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Cook County Expressway Plan

By George A. Quinlan

Superintendent, Cook County Highway Department

THE EXPRESSWAY SYSTEM for Cook County outside of Chicago is shown on the accompanying map. In general, these routes continue the city system outward from the city limits. Edens Expressway to the north of the city has recently been completed for a distance of 14 miles and the Calumet Tri-State route extending 9 miles to the south has been open to traffic for more than a year. Other sections of this system are in various stages of construction, design and planning.

Both expressways which are now in operation are exemplary for their fine esthetics and design. The pavements are of portland cement concrete, mostly three lanes in each direction separated by a median strip of variable width. Lanes are marked with reflective paint, which has been found effective in providing orderly traffic movements in the heavy daytime peak hours and in guiding motorists after dark.

The structures are of clean, unobtrusive modern design. One of the first overpasses to be built on Edens Expressway was a first prize winner in the Institute of Steel Construction's annual competition.

Both of the routes now open to traffic were planned immediately prior to World War II. They were designed for the most part and rights of way were obtained during the war period and they were constructed after the cessation of hostilities in an unusually long span of time between conception and completion.

In general the design of these highways follows common expressway practice. A 70 mph design speed has been used. Where the interchange of traffic inside the city is accomplished by parallel ramps to conserve right-of-way, the rural areas feature clover leaf designs because of the faster movement of traffic flow on intersecting highways and the availability of larger areas of land.

While the detailed description of the traffic features of these routes might be of some interest to many, it is believed that the experience of the agencies of Chicago in the operation of its existing routes as well as the planning and design of the new routes might be more beneficial to those who are conducting or contemplating similar work in other locations.

Largest Origin-Destination Survey

Chicago's expressways both inside and outside the city of Chicago were planned using an origin-destination survey of 1941 as a basis. This was not only one of the largest surveys of the kind ever made, but was one of the first and represented a true pioneering effort. It was admirably suited for the general planning of the system. However, because of the large zones used, it has been found difficult to assess the usage of ramps to and from the improvement. A new O-D survey is being contemplated for the Chicago area and it is hoped that zones of a maximum size of one mile square can be used in this project.

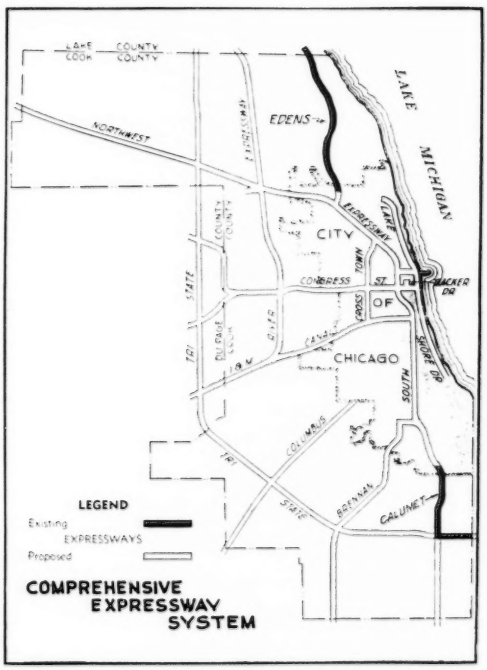

Fig. 1

Cook County's comprehensive superhighway system plan.

Planning these rural sections outward from the edge of the city has brought forth a new problem. The routes within the city provide capacity for a normal weekday peak hour. In the rural areas the basis of design is the 30th maximum hour of the year, which is usually accepted as occurring on a summer Sunday. The conversion of our weekday O-D pattern to a summer Sunday traffic flow has been a source of practically continuous concern. It is hoped that the derivation of a true Sunday traffic pattern can be included in the new O-D survey to be conducted locally in the near future.

In order to obtain traffic volume characteristics of expressways in general and particularly to determine bases of future design, fixed permanent traffic counting stations have been installed on the expressways which are now in operation. Each of these stations consists of a transverse row of pressure sensitive pads, one in each lane of the expressway

Fig. 2
Ramp approach sign.

at the location of the station. The wiring and counting mechanisms provided will permit continuous counting throughout the year, and data concerning the use of the entire through pavements or of any single lane or combination of lanes can be obtained as desired.

A large "before and after" origin-destination study is being made of the traffic tributary area of the Edens route between the Chicago city limits and the Cook County line in an effort to establish a procedure, while an expressway is in its first stages of planning, to assess the use of that project. The O-D information prior to the construction of this expressway has already been gathered and the first "after" study is expected to be made late this summer.

Both Edens and Calumet Expressways were planned in the days when various experts were displaying aerial photographs showing by means of oil stain patterns on ramp pavements the use and disuse of the elements of a cloverleaf ramp system. Following the general trend of thought, the two expressways have several traffic interchanges where ramps have been provided in the predominate direction only because the others were not believed justified.

The signing and enforcement necessary to prevent movements in the direction not provided for has, however, become a major problem. Temporary ramps have already been provided at one point to attempt to alleviate this condition.

This experience, as well as the fact that the movements in the opposite direction on summer Sundays have been greater than anyone had anticipated, has led to the planning of future work with interchanges which provide, wherever possible or feasible, for all movements.

Wide Medians Needed

There seems to be a desire for ever increasing widths of median dividers. Inside the City of Chicago, with crossover structures occurring every quarter mile, each inch of extra median width adds appreciably to the aggregate cost of the improvement. In the rural areas, on the other hand, right-of-way is less expensive and structures are more distantly spaced. It is therefore more practical to provide wider medians in these locations.

With traffic moving at speeds of 60 miles per hour in these open areas the nighttime use of high beams of headlights will be mandatory. The planting of foliage in the median is invaluable to block the glare thus occasioned, and wider medians are required to support this landscaping treatment.

Because of the distance between interchanges the desirability of a continuous fence in the median for prohibiting left turns on the expressway was debated. The need for fencing at interchanges to prevent illegal movements, however, was quickly recognized. Fencing at the interchanges only was therefore installed, the fence carried almost 1000 feet beyond the turnoff points on the ramps. "U" turns almost immediately became concentrated at the termination of these fences. Extension of the barrier only seemed to move the point of violation farther down the roadway. Hence, a continuous median barrier is now generally agreed to for both future expressways and those now in operation.

There has been some difference of opinion in the design committee as to the relative merits of highway lighting versus highway delineation. In an effort to learn more about these two media it has been decided to illuminate the Edens Expressway with mercury vapor lights in accordance with standards of the Illuminating Engineering Society and to provide the Calumet Tri-State Expressway with delineation throughout its length. A study of the operations of these two expressways over a period of time should provide valuable information concerning the merits of these media as they affect after-dark operations.

In order to give the driver on the high speed, multilaned expressways advance warning of the interchanges, a special system of signing has been devised. In general, the expressway signs are larger than the signs found on the existing highway system in order to compensate for the higher speeds and wider roadways. Two examples of the expressway signs are shown in Figures 3 and 4. This system, involving the use of but two signs employing terse wording to indicate the point of an interchange, has been extremely effective.

Merging "Yield" Sign Used

The ramps intersect the expressway at very flat angles. This design feature permits the two traffic streams to join in a merging maneuver which, at many locations throughout the country, has proven to be the least hazardous method of uniting two conflicting streams of traffic. Drivers are warned of the impending conflict point by means of the sign assembly shown in Figure 5. This is believed to be the first application of the merging traffic-yield right-of-way sign in Illinois.

The intent is to tell a driver facing the "yield" sign that, in the event of simultaneous arrival of vehicles on each approach to the conflict point, he must give the right-of-way to the vehicle on the expressway. In the absence of conflicting traffic, the driver facing the "yield" sign may enter

(Continued on page 472)

Fig. 3
Sign at turn-off ramp.

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Chicago's New Greyhound Bus Terminal

By the Firm of Skidmore, Owings & Merrill, Architects, Chicago Illinois

THE NEW Greyhound Bus Terminal, under construction in Chicago's busy Loop, is the only bus terminal known to be built completely underground. It is located in the most congested section of the city where it can best serve the population which uses buses and at the same time the Terminal does not contribute to the vehicular congestion of the area. Ralph A. L. Bogan, Executive Vice-President of the Greyhound Corporation, states that bus operations of the terminal are scheduled to open this fall. Commercial areas provided in the building will be completed later in the year.

The problem of the architects, Skidmore, Owings & Merrill, was to help Greyhound develop a complete bus terminal on a high-revenue site without sacrificing the inherent income-producing possibilities of the property. The solution was a unique one, both economically and functionally. Since it was impossible to finance such a site by the operation of the terminal alone, and since the bus operation needed a large area but not a high building, nor much actual street frontage, a building for multiple occupancy was dictated: the bus terminal underground where it will create no interference with space above, stores on the street floor to capitalize on the valuable street frontage, general auto parking above for the tenants and the general public, and possibly a future office tower paying air rights.

It is the excellence of the location, in convenience to the bus-traveling public, which presented the economic and traffic factors. It is the heaviest traffic area in Chicago—both vehicular and pedestrian. The Loop is the center of Chicago's business population, and the Terminal, occupying a half block area of 66,000 square feet—on Clark between Randolph and Lake Streets—is in a 24-hour area, with a concentration of the shopping, restaurant, and theater population. The Greyhound Corporation chose this site, in the center of the city, to provide maximum convenience to bus travelers. It is served by street car, bus, elevated, and subway; and the transfer distance to railroad terminals and airline limousine stops is a matter of a few blocks.

Bus Terminal in High Rent Area

It was evident that a bus terminal could not hope to produce anything like the rents earned by such a site. The architects therefore developed this underground scheme which subordinated the entire bus terminal to income-producing areas of the building. In solving the economic problem, the traffic problem too was solved. By putting the entire bus terminal proper underground, it eliminated the need for buses adding to the existing street-level congestion and entering the building at its busy street frontage. The solution to the traffic problem was furthered by the fact that adjacent to the north side of the site is the unique two-level Wacker Drive, which is part of, and leads into, a lower-level network of truck and heavy vehicular trafficways —a traffic engineering feature of which Chicago can boast over other cities. By utilizing this ready-made underground routing for the buses, they will have perfect access to and from their underground terminal and will be able to travel the entire necessary distance out of the Loop, either east or west, below level without interfering with Loop traffic, and making fast connections to the new expressways which are now under construction. A tunnel was built under Lake

Architect's rendering showing Terminal with 10-story tower to be added in future.

Street to provide ingress and egress from the bus concourse, two levels underground, into a little-used street feeding into the lower level of Wacker Drive.

The multi-story tower contemplated for future construction atop the five-level bus terminal will be surrounded at its base with a park, on the roof of the top parking level, thus creating the building's own green environment, unique in the busy Loop.

First Five Levels Under Construction

The base portion of the project, now reaching completion, has five levels—three above and two below ground. These are, from top to bottom: two public auto parking levels, a street-level terminal entrance surrounded by shops and restaurants; an intermediate floor below containing waiting room ticket office, and concessions; and on a second level below the street, the bus loading concourse.

Passengers enter the building from three main streets—Lake, Clark, and Randolph—and descend by moving stairways to the waiting room situated in a two-story well on the intermediate floor. From there, moving stairways carry them down to the bus loading concourse.

On the bus concourse level, loading stations for 31 buses surround the enclosed passenger island. Pedestrian circulation is separated from that of the buses, by means of the passenger island, ensuring safety to the pedestrians and freedom to the buses. With an allowance of 15 minutes for the loading of each bus, the terminal can handle up to 120 buses every hour, or about 18,000 passengers per day.

The intermediate underground floor is an all-purpose level where bus terminal and commercial building meet. It contains a waiting room with seating accommodations for 500 persons; ticket windows, lockers, baggage checkroom with facilities for the baggage to be transported mechanically down to the bus concourse; a Greyhound Post House restaurant; a travel bureau; offices for Terminal personnel; and rentable areas for concessions in close proximity to all circulation and waiting areas.

The street level consists largely of rentable space. Circulation through the building is by shopping arcades. A two-story well in the center is a main feature. Ramps from the street level connect with two levels of auto parking above.

The auto parking floors, which have been in operation since early in the year, provide for an urgent need in the central business district, and thus also a most important advantage for the occupants of the Terminal. Enclosed parking is provided on the second level, and open on the third, for a total of 500 cars.

The Terminal represents a $10,000,000 investment and is the largest independently owned bus station in the world. It is second in size to the New York Port Authority bus station which is owned by the municipality.

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One-Way Streets in Chicago's Loop

By James L. Foley, Jr. (Assoc. Mem., ITE)
Bureau of Street Traffic, City of Chicago, Illinois

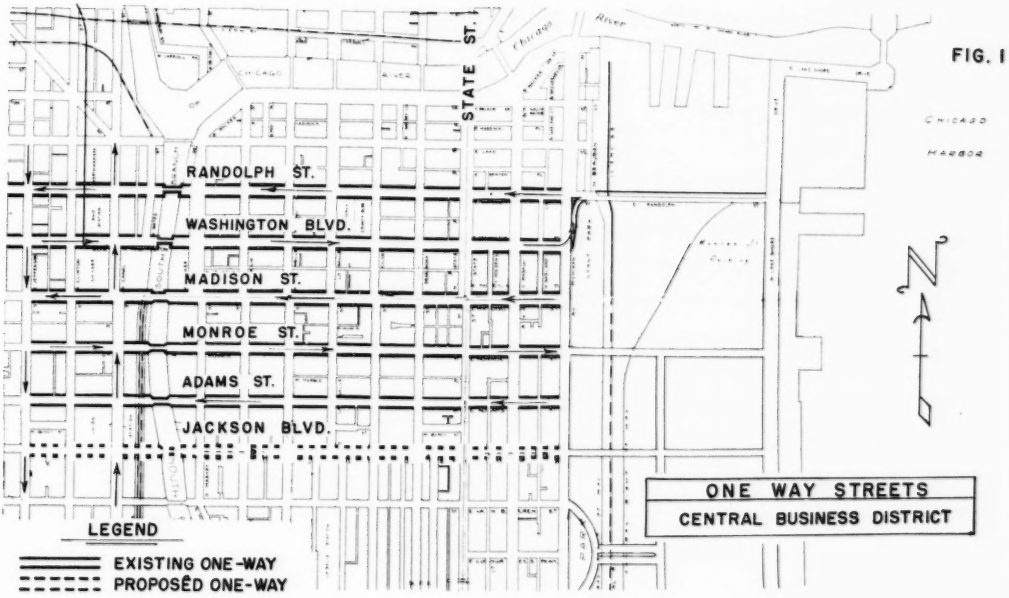

FIG. 1

Fig. 1
One-way streets in Loop.

On November 10, 1952, the City of Chicago put into operation a system of one-way streets in the Central Business District. This system was the result of many years discussion of the pros and cons of one-way streets. The problem was studied intensively for over a year by the Bureau of Street Traffic in cooperation with a special committee appointed by Mayor Martin H. Kennelly. The Chicago Park District, the Chicago Transit Authority, the Chicago Motor Coach Company, the Chicago Motor Club, the Chicago Association of Commerce and Industry and the Chicago Plan Commission were represented on this committee. The committee was a working committee which analyzed data collected by the various participating agencies.

Conversion of many former streetcar lines to rubber tired equipment eliminated one of the major stumbling blocks in earlier attempts to develop a one-way street system in the "Loop." This use of free wheel transit vehicles permitted route changes which could not have been effected with fixed rail equipment.

The system installed consisted of five adjacent streets providing an alternating pattern of three westbound and two eastbound streets.

The complete system includes a sixth street, Jackson Boulevard, which is under the jurisdiction of the Chicago Park District. It is expected that this street will be included as an eastbound street as the more comprehensive Loop plan develops.

The streets presently in one-way operation are:

Adams Street—Westbound from Michigan Avenue to Jefferson Street

Monroe Street—Eastbound from Jefferson Street to Michigan Avenue

Madison Street—Westbound from Michigan Avenue to Jefferson Street

Washington Boulevard—Eastbound from Jefferson Street to Michigan Avenue

Randolph Street—Westbound from Michigan Avenue to Jefferson Street

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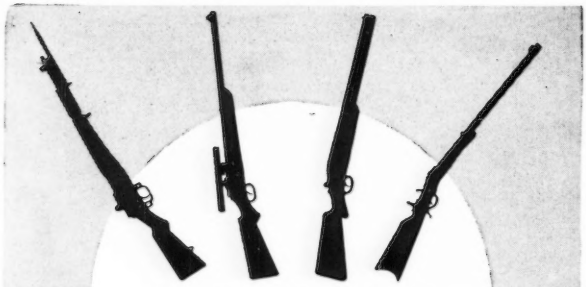

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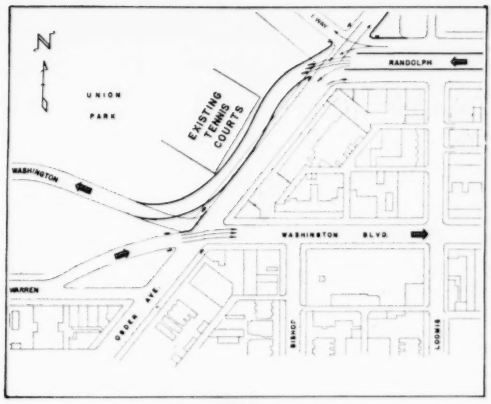

Fig. 2
Plan of reconstruction at Union Park.

On completion of a new roadway now under construction through Union Park, the one-way operation of Washington Boulevard and Randolph Street will be extended west to connect with the existing pair of one-way boulevards, Washington and Warren. At present these two boulevards converge in Union Park into two-way operation on Washington Boulevard. Barring unforseen difficulties, this extension should be in operation prior to the 23rd Annual Convention in September, 1952.

During the study which preceded the selection of directions finally chosen, serious consideration was given to a plan which would have provided that the direction be oppisite to those finally chosen. Some of the engineers cooperating in the development of the system felt that traffic operating on Michigan Avenue would be better served if the alternate plan were selected. However, adjustments have been made to Michigan Avenue controls which permitted the successful operation of the selected plan.

As is usually the case in the selection of one-way streets, fear of the effect of one-way streets on business was expressed by some of the merchants. After several meetings, all interested parties agreed to a trial. To date, no complaints have been received. On the contrary, favorable comment by the newspapers and others has been received.

The benefits expected from one-way operation were:

1. A ten to twenty-five per cent increase in capacity.
2. A reduction in accidents.
3. Improved speed through better progression.

One-Way Plan Increases Volumes

Volume counts made during the annual Cordon Count in May showed that westbound traffic leaving the Loop in the average evening rush hour increased 17%. Eastbound traffic, on the other hand, was unchanged (less than 0.4% decrease). The variation between these percentages probably is due to the reduction of eastbound capacity in the present unbalanced system. The balanced capacity will be attained when the other eastbound street is added.

A comparison of accidents on the one-way streets for the first five months of 1951 and 1952 shows a 22½% reduction in all accidents. The greatest improvement was shown in midblock accidents, which were reduced from 144 to 72.

Morning rush hour speed and delay runs made before and after the installation of one-way streets show an average increase from 8.0 mph to 11.65 mph. The increase varied from 27% on Madison Street to 59% on Randolph Street. In the evening rush hour, average speeds on the westbound one-way streets increased from 5.9 mph to 12.8 mph. On Washington Street speed increased from 3.2 mph to 4.9 mph while Monroe Street decreased from 5.8 mph to 2.9 mph. Eastbound speeds should improve when the system is completed.

The Randolph Street Market presented a special problem. Since 1880 the Randolph Market has been in existence between Desplaines and Halsted Streets. At that time 118 foot pavement was provided for traffic and market operations. In 1908 the market and pavement were extended west to Sangamon Street. In 1923 the widened pavement was extended to Ogden Avenue.

Because of the importance of the market, the entire 118 foot pavement could not be made one-way. The pavement was divided, therefore, into a through westbound center roadway 40 feet wide and two 36 foot local drives to serve the market area. This division was accomplished by the construction of three foot separating islands.

Union Park Construction

Because Ogden Avenue, the existing logical connection between Randolph Street and Washington Boulevard, is now overloaded, a new roadway is being constructed through Union Park. In addition to providing the capacity required, the proposed roadway will provide a safer and more expeditious connection between the proposed one-way Randolph Street and the existing one-way Washington Boulevard. The present connection between Warren and Washington Boulevard will be retained.

The installation of the east-west one-way system permitted a marked improvement in progressive signal timing in the Loop. On the east-west streets a 25% offset was used. This resulted in a double alternate system on the north-south streets. A 65 second cycle was used which provided an east-west progressive speed of 17 mph and a north-south progressive speed of 20 mph.

The basic split was changed from 50/50 before the installation of the one-way streets to 55% for the north-south streets and 45% for the east-west one-way streets because of the greater capacity of the latter. Minor adjustments have been made at several locations to reduce or eliminate congestion points which developed.

Left turns, formerly prohibited in the Loop, were permitted from the one-way streets. However, full utilization of left turn circulation was not obtained because of left turn prohibitions which were retained on the two-way streets. The resulting back up of traffic in right turn lanes has been reduced by eliminating these prohibitions along LaSalle and Dearborn Streets.

A serious conflict between transit vehicles and other vehicular traffic occurred at the east end of Washington Street. A high volume of buses was required to cross two lanes of

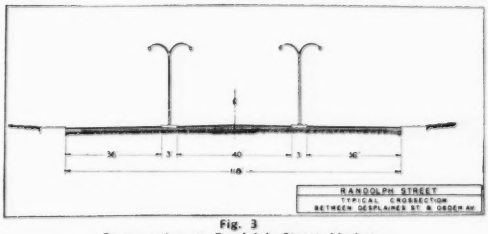

Fig. 3
Cross-section at Randolph Street Market.

(Continued on page 476)

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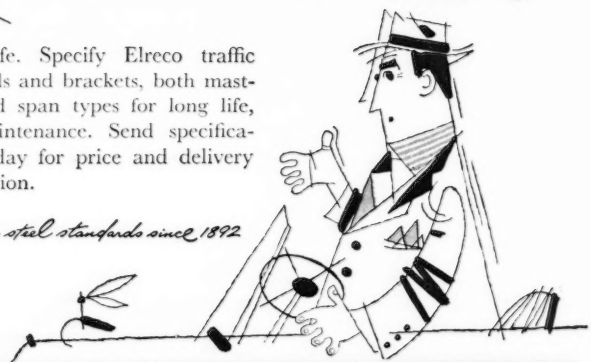

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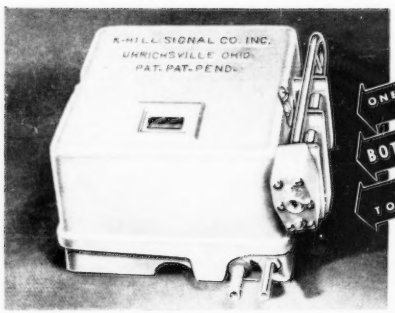

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Local Transit in Chicago

By the Public Relations Department, Chicago Transit Authority

OPERATION OF Chicago's major local transit facilities, and their regulation and government, may be divided into three separate, distinct periods. Through two of these periods, these facilities (the surface and rapid transit systems) were privately owned and operated. Their passing ushered in the third and present period—the era of ownership and operation by an Authority, a unique, self-regulating public corporation.

City Control—Prior to 1913

The first period was one in which regulation was accomplished by special city ordinances. These ordinances were in the form of grants of authority to "install, maintain and operate" transit facilities on or across public highways. Regulatory provisions relating to rates of fare and service were incorporated in these ordinances.

This situation certainly did not foster the development of anything that could properly be called a local transit system. And none came out of it. Instead there grew up a patchwork of overlapping, competing and unrelated franchises which were both the source and the product of political corruption, and were the medium of wild financial speculation.

In the latter years of the period of city control, however, important steps were taken toward organizing a comprehensive transit system. The City Council enacted in 1907 a series of ordinances, known as the Settlement Ordinances, which turned the course of Chicago traction away from the chaos that had been produced by the indiscriminate granting of franchise rights.

In effect, these Settlement Ordinances established two strong railway systems, that of Chicago Railways Company, to operate in the north and west areas of the city, and that of Chicago City Railway Company and its affiliates, to operate in the south area of the city.

By the terms of these ordinances, the two systems were to be protected for a period of 20 years against invasion of their territories by competing franchise holders. The City Council specifically prohibited the granting of rights to any other company to operate street railways on any of the streets covered by the Settlement Ordinances, unless the city, or its grantees, had purchased the properties of these two systems at prices to be fixed in accordance with the terms of these ordinances.

The second major forward step taken during the period of control by City Ordinance was the adoption and acceptance of the Unification Ordinance of 1913. Under this ordinance the two systems, which were owned by four pro-

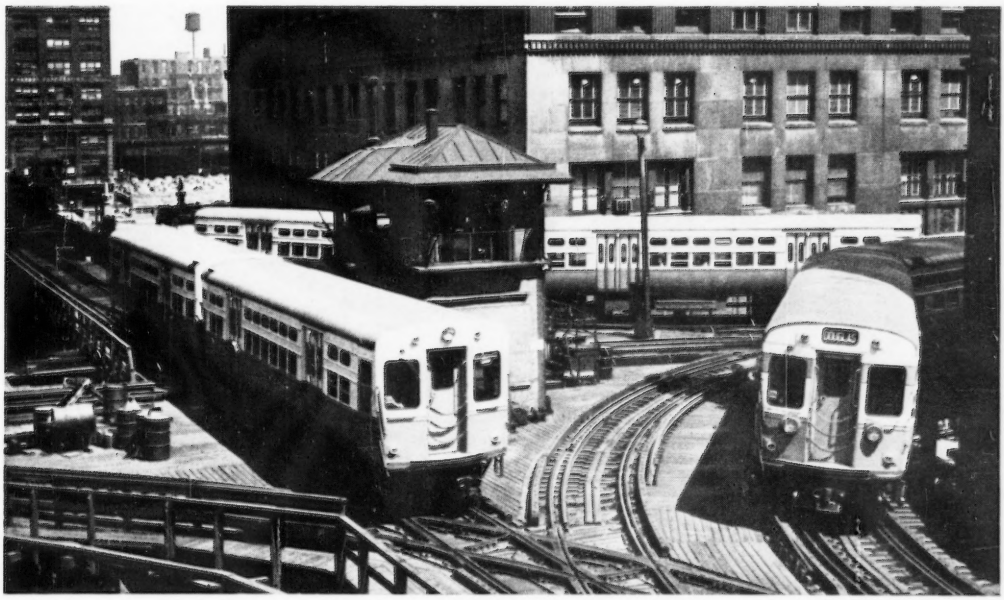

Fig. 1

One of world's busiest railroad intersections at Wells and Lake Streets. During typical rush hour 830 cars in 148 trains pass CTA's interlocking tower.

prietor companies, were brought under the management of a single operating agency, termed the Chicago Surface Lines Board of Operation. Cross-town through routes were established for the first time along with city-wide transfer privileges for surface riders. This unified surface system embraced the properties of at least 39 underlying or predecessor companies.

Meanwhile, the elevated system, too, had for all practical purposes, become a single unified system, entirely independent of and a competitor of the Surface Lines System.

State Commission Control—1913-1947

The second major period of local transit in Chicago dates from 1913, when the Illinois General Assembly placed control of local transit companies and other utilities in a State Commission, originally the Public Utilities Commission, and now the Illinois Commerce Commission. This period extended to October 1, 1947, when the properties of the Chicago Surface Lines and the Chicago Rapid Transit Company were acquired by Chicago Transit Authority.

During the early years of this second period, Chicago's local transit companies enjoyed great prosperity, but in the later years of the period they came to near destitution. Their decline from prosperity to poverty occurred while the regulatory policies established in the latter part of the previous period were being drastically revised, and while social and economic developments, not favorable to local transit were taking place. Among the changes were the following:

1. Competing carriers, principally bus lines were allowed to parallel and compete with some of the most heavily traveled surface routes in the areas of highest population and highest riding density.
2. Extensions of service which in themselves were unprofitable, were authorized and, in some cases, were required.
3. Fares were not allowed to increase as operating costs increased. The elevated, in particular, operated for a period of several years at rates insufficient even to meet actual operating expenses before judicial relief from the confiscation was finally obtained.
4. An inter-system transfer privilege for a single fare was established without permitting the carriers to make adequate additional charge for this privilege. In effect, the imposition of this inter-system transfer privilege on the carriers, while they still remained separate and were obliged to compete with each other, was but a disguised fare reduction.
5. Competition from the private automobile also began to cut seriously into transit revenues, and the expanding acceptance of a shorter work week still further reduced local transit riding.
6. Shifts in population outward from the central business district created blighted areas in territories which formerly had been productive in profitable short-haul traffic. Transit revenues were also seriously affected by Chicagoans leaving the city in steadily increasing numbers to establish homes in the suburbs to the north, west and south. The war temporarily minimized the effect of population shifts, competition from the automobile, and the shorter work week, but their impact upon local transit was intensified in the post-war period.

The period of control and regulation of Chicago's major local transit facilities by the Illinois Commerce Commission ended with the Surface and Rapid Transit systems in financial distress. Both companies were in receivership. The Surface Lines' receivership is one of the longest on record, dating form December 15, 1926, when the Chicago Railway Company, the north side lines of the Surface Lines Group, went into receivership. The other lines in the group were placed under receivership on July 7, 1930. These receiverships ended September 30, 1947 with purchase of the properties by the Chicago Transit Authority.

The Surface Lines had managed, with considerable difficulty, to meet interest payments on its first mortgage bonds, but for a period of 16 years it had not earned and consequently had not paid compensation for use of the city streets. It had also defaulted year after year on interest and principal payments to the holders of its junior securities.

Even more desperate was the financial plight of the Chicago Rapid Transit Company. For years it had been unable to make any interest or principal payments on any of its outstanding securities. It was actually at the point where just meeting current payrolls was a struggle.

It is not surprising that little new rolling stock was purchased in the latter years of this period. None at all was bought by the Chicago Rapid Transit Company.

Old, outmoded equipment had to be kept in service, regardless of the cost of operating and maintaining it.

By the end of this second period, the average age of rapid transit cars was 42 years; streetcars, 32 years; trolley buses, 15 years, and the comparatively few motor buses, 4.4 years. Equipment generally had deteriorated; and so, consequently, had service.

Authority Ownership and Operation—1947

On September 30, 1947, the surface and rapid transit systems passed from private to public ownership and operation when Chicago Transit Authority, a public corporation created two years previously, purchased the facilities of the two systems for $87,162,500.

It was claimed that these facilities originally had cost between $250,000,000 and $300,000,000. The net cost to the CTA actually approximated only $62,000,000 since the CTA obtained $25,000,000 in renewal fund cash with the surface lines purchase.

The decision to turn to a public authority, of a type unique in American public utility practice, was not spontaneous. Neither was it reached easily. It came only after six separate, prolonged but fruitless efforts to reorganize the surface and rapid transit systems as a private company. Public officials, and civic, business, industrial and financial leaders joined in these efforts, but capital simply could not be induced to rescue the two companies from receivership and bankruptcy, either separately as new companies, or as a single new company.

When reorganization as privately owned company or companies had to be abandoned, the leaders in the fight to provide modern local transit for Chicago turned reluctantly to public ownership as the only remaining solution of the city's critical traction problem.

Two courses were open in the public ownership approach—one, a service-at-cost, self-supporting operation; two, an operation subsidized by regular yearly tax levies upon the owners of real estate and personal property.

The Authority type of operation, specifically deprived of the power to tax, was conceived and jointly sponsored and recommended to the Illinois General Assembly by the Federal Court in which the surface and rapid transit receivership cases were pending, by the then Mayor of Chicago, and by the then Governor of Illinois.

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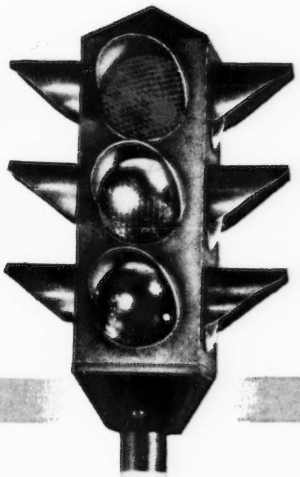

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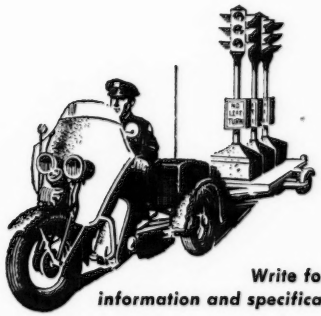

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real estate interests, and by leaders in industry and commerce. The necessary legislation was enacted by the Illinois General Assembly, and approved April 12, 1945. At a referendum election in June, 1945, the legislation was made effective by a vote of 6 to 1 by electors of Chicago and Elmwood Park. Two more years, however, were required to perfect the purchase plans, obtain capital funds by issuing and selling $105,000,000 of revenue bonds, and to effect the purchase of the properties.

The Authority, as the term implies, is a self-regulating municipal corporation, separate and apart from other governmental agencies, federal, state and local.

Governing and administrative agency of Chicago Transit Authority is the Chicago Transit Board, consisting of seven members. Four members are appointed by the Mayor of Chicago with the advice and consent of the City Council. Three members are appointed by the Governor of Illinois by and with the consent of the Senate. Each appointment by the Mayor is subject to approval by the Governor, and each appointment by the Governor is subject to approval by the Mayor.

The terms of initial members were staggered, but each of their successors is to serve a seven-year term. The Board selects its own officers. A board member's compensation is $15,000 per year. The Chairman, however, who alone is prohibited from engaging in any other business or employment, is paid $35,000 per year.

Present members of the Board are: Ralph Budd, Chairman, retired President of the Chicago, Burlington, and Quincy Railroad and its subsidiaries; Guy A. Richardson, Vice-Chairman, former President and Chairman, Board of Management and operation, Chicago Surface Lines; William W. McKenna, Secretary, lawyer, formerly Executive Assistant to Mayor of Chicago; Philip W. Collins, insurance company executive and former member of Illinois Commerce Commission, Chairman of the Illinois Tax Commission, and State Director of Revenue; John S. Miller, lawyer and director of Chicago National Bank; James R. Quinn, lawyer and former chairman, Committee on Local Transportation, City Council, City of Chicago, and John Holmes, President of Swift and Company.

The Board's first chairman was the late Philip Harrington, engineer, who designed and supervised the construction of Chicago's initial system of subways.

Walter J. McCarter, engineer and long time local transportation company executive, formerly General Manager of the Cleveland Transit System, is General Manager of Chicago Transit Authority.

The Board is under a direct mandate from the Illinois General Assembly, expressed in Section 30 of the Metropolitan Transit Authority Act, to provide service at actual cost, as a public service venture financed by private capital. This section of the Act requires the Board to fix rates, fares and charges sufficient in the aggregate to pay all expenses, cover depreciation, modernization of the properties, service and retire the debt, and to pay the city for the use of the city-owned streets and subways, all of these items together with payments for use of park district streets constituting the actual cost.

The General Assembly buttressed this mandate for operation of the Authority at actual cost by providing that "The Authority shall not have the power to levy taxes for any purpose whatsoever."

The Board's responsibility for over-all policy, and for effective application of the Authority's broad corporate powers, is expressed in the act as follows:

> "It shall be the duty of the Board, as promptly as possible, to rehabilitate, reconstruct and modernize all portions of any transportation system acquired by the Authority, and to maintain at all times an adequate and modern transportation system suitable and adapted to the needs of the municipalities served by the Authority, and for safe, comfortable and convenient service."

Board's Powers Are Extensive

Certain of the Board's extensive powers are mandatory; others are permissive. In the category of mandatory powers, the Board shall:

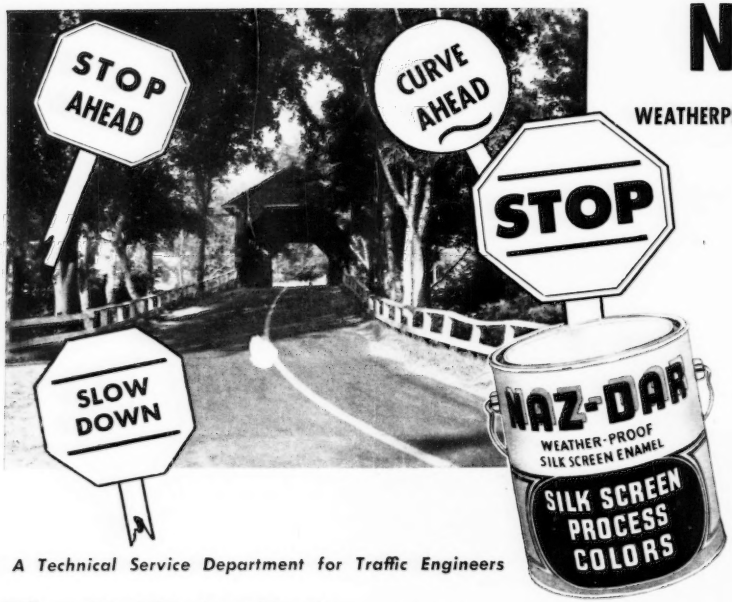
1. Make all rules and regulations governing the operation of the transportation system.
2. Classify positions and grades of regular employment and make rules governing appointments on the basis of merit and efficiency.
3. Fix rates, fares and charges sufficient in the aggregate to pay operating expenses, fixed and other charges.
4. Adopt rules and regulations for competitive bids on purchases of equipment, material and supplies, construction contracts, or sale or lease of Authority property.

In the category of permissive powers, the Board may:

1. Enter into written wage, working conditions and pension contracts with employee representatives.
2. Establish a depreciation policy which makes provision for the continuous and prompt replacement of worn out and obsolete equipment.
3. Investigate all means of transportation and the management thereof as well as investigate the enforcement of its ordinances, rules and regulations, and the action, conduct and efficiency of all officers, agents and employees of the Authority.

Balancing these extensive policy-making and administrative powers of the Board are safeguards intended to protect the public from misuse of these powers. The most important of these provide that:

1. Any Board member may be removed for incompetency, neglect of duty or malfeasance in office.
2. All ordinances, resolutions and all proceedings of the Authority are public documents and open to public inspection, except such documents or records kept or prepared by the Board for use in negotiations, actions or proceedings to which the Authority is a party.
3. No discrimination shall be made in any appointment because of race, creed, color, political or religious affiliations.
4. No officer or employee shall be discharged or demoted except for cause which is detrimental to the service, and any employee discharged or demoted shall, on demand, be granted a public hearing by the Board.
5. Contracts for services, sale of property, construction of facilities, or for the purchase of equipment, materials or supplies, involving $2,500 or more, shall be awarded to the best bidder only after competitive bidding, except that in cases of emergency, this safeguard may be waived by vote of at least five members of the Board.
6. Contracts shall not be split into parts involving less than $2,500 each; all contracts involving less than $2,500 shall be by competitive bidding whenever possible.



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The Mid-West Section of the Institute of Traffic Engineers

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Traffic Control Corporation, Chicago, Illinois
Tuthill Spring Company, Chicago, Illinois
The Union Metal Manufacturing Company, Canton, Ohio
Willett Company, Chicago, Illinois
Yellow Cab Company, Chicago, Illinois

Major Powers of Authority

The Authority, as a corporate entity, is vested with these major powers:

1. To own and operate a unified transportation system in the Chicago Metropolitan Area.
2. To acquire other local transit properties by purchase or by condemnation, or to operate them on lease.
3. To enter into agreements with other local transit companies and railroads for joint use of facilities or joint fares.
4. To use any public road, street or other public way in the metropolitan area for the interurban transportation of passengers.
5. To borrow money for modernization of its rolling stock and other facilities, or for the purchase of additional transportation facilities and properties.
6. To issue bonds, or other evidences of indebtedness payable solely out of operating revenues.

Under its modernization program, the CTA has bought, contracted to buy or arranged the financing for a total of more than 2,815 modern cars and buses.

As of January 1, 1952, 2,662 modern units—600 streamlined streetcars, 900 modern gasoline or diesel buses, 407 modern trolley buses, 551 propane buses, and 204 all-metal "L" subway cars were in service or available for service. Delivery of 153 additional new trolley buses, is scheduled during 1952. The 2,815 modern units are costing approximately $60,000,000, and constitute the greatest single advance in equipment modernization in the history of local transit in Chicago. In 38 years prior to the start of the CTA's modernization program five years ago, the two companies had spent only $46,000,000.

In fact, Chicago Transit Authority's most recent equipment modernization transactions (July 27, 1950) made history in two respects for the entire transit industry. First, the CTA placed orders for 500 buses and 70 additional all-metal, "L"-subway cars, completed financial arrangements for this equipment and for 130 "L"-subway cars that were then being manufactured for CTA, and negotiated financing for 350 modern trolley buses; second, the 500 buses are propane-fueled units, the first large fleet of propane-fueled buses ever ordered by any local transit company.

The CTA's progress in equipment modernization also reflects the progress that has been made in other phases of its operations. In the beginning, there were two complete sets of departments taken over from the predecessor companies. These departments have been consolidated, operations have been unified, and extensive economies have been achieved along with improvements in service.

The CTA's credit now appears to be firmly established. This is indicated by the fact that the more recent equipment purchases were financed in a major part through sale to John Nuveen and Company, a Chicago firm of investment bankers, of $15,825,000 of trust certificates subordinate to the $105,000,000 issue of revenue bonds. Normally, payments to retire equipment trust certificates come ahead of principal and interest payments on outstanding bonds. Currently, over $1,000,000 of these securities has been retired, and the entire obligation is to be paid in approximately five years.

Advantage of Authority Operation

In proposing Chicago Transit Authority as the means of solving the city's long standing transit problems, its sponsors intended that it should have important advantages, in corporate structure and in corporate powers, over the usual types of privately or publicly owned local transit companies, but that any income above requirements should be used to improve the service. The Illinois General Assembly accepted this philosophy and vested the Authority with broad powers.

In the comparatively short period of Chicago Transit Authority operations, these powers have been tested and it appears to have these major advantages:

1. A municipal corporation type of organization, such as Chicago Transit Authority, preserves the vital principal of private enterprise, that it must be self-supporting. A specific provision of the law compels the Authority to pay its way out of revenues derived from its transit operations. The right to levy taxes "for any purpose whatsoever" is specifically denied. The initiative, which characterizes private operation, is thus necessary for success.

   In its administrative set-up, the Authority is similar also to a private organization, inasmuch as power to direct operations is vested solely in the management. There is no intervening agency or group diluting management's authority or sharing management's responsibility. Management alone is accountable for the success or failure of the enterprise, and it is accountable directly to its customers.

   There is, consequently, a powerful incentive for management to strive at all times for efficiency and for improvement in the service.
2. Full and complete power and obligation to provide attractive, modern service are vested in Authority management, and in no other agency, but the service including modernization, must rest entirely on the fares the Authority charges.

   Fares must be adjusted with reasonable promptness to changing operation costs. This mandatory requirement upon authority management assures the car riders that operating deficits will not be permitted to pile up to endanger the authority's financial stability and credit, and that there will be no deterioration in service and no interruption of the program of modernization. Management cannot avoid these adjustments in fares and it must bear the responsibility of determining when the adjustments are required, and in what amount.
3. Management-customer relationship in the authority type of operation is closer, more direct than in public utility operations, local transit included, whose managements are not vested with regulatory powers. This unusual management-customer relationship also exerts upon the management a compelling influence for capable, conscientious effort on the public interest.
4. Under authority ownership and operation, the riding public and the private investors are in partnership to provide essential public service and to assure continuing modernization of this service, all at actual cost to local transit riders.

   In this unique partnership arrangement, there is give and take on the part of both investors and the public. For the use of their money, private investors receive only a fixed rate of interest. No profits are paid to them. In return for not sharing in the profits, CTA investors are guaranteed their interest when due and the return of their principal at maturity. To compensate for this commitment to investors, the transit riders alone are permitted to benefit from the profits, which, in the authority type of operation, are earnings in excess of fixed charges. These earnings are retained by the Authority and must

(Continued on page 473)

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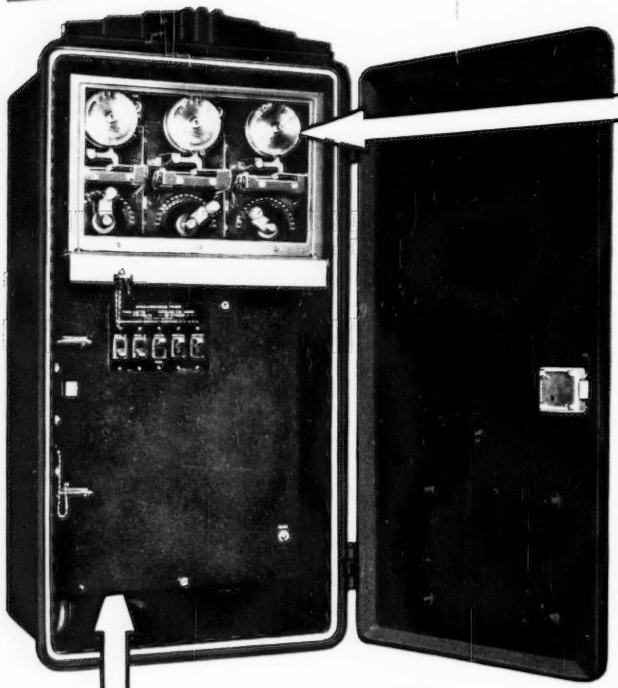
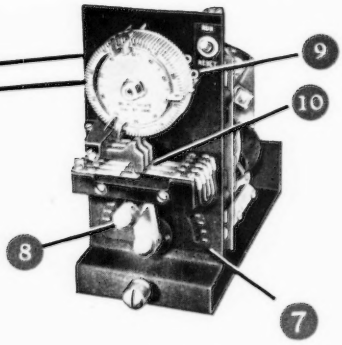
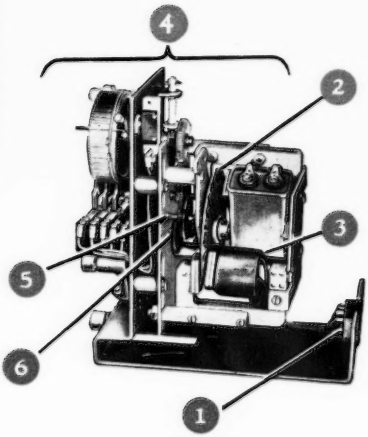
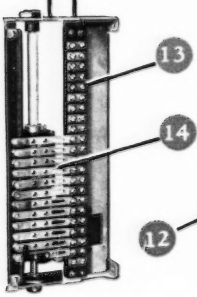




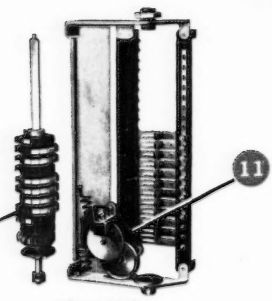
Dial-Unit
Enlarged Front View



Dial-Unit
Enlarged Side View



Cam-Unit
Right Side



Cam-Unit
Cam Shaft Removed
Left Side

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The Crouse-Hinds Type LS Synchronous Controller differs in its basic construction from controllers of conventional design. In the Type LS Controller, each timing-dial with its driving motor is constructed as an individual unit. All dial-units are jack-mounted to the controller assembly, and may be quickly and easily removed.

The Type LS Controller can be supplied with 1, 2, or 3 dial-units. Each dial-unit can be set for a different time-cycle, a different timing-split and a different offset. All controllers have provision for three dial-units regardless of the number of units initially purchased. Therefore, the Type LS Controller is ideal where a single-dial controller is sufficient at the time of installation, but where future needs may call for additional dials.

The Type LS Controller may be purchased with 1, 2, or 3 resets on each dial-unit. When shipped from the factory, all dial-units are wired for 3 resets. Reset 2 and reset 3 may be added in the field to single-reset dial-units by simply installing dial contacts and switch arms. It's as easy as that!

Important Features of the Dial Unit

1. Jack-mounted quickly-removable from the controller assembly.
2. Disc-type synchronous motors provide high-torque with proven reliability.
3. Electro-dynamic braking assures accurate maintenance of offset.
4. All parts readily accessible for inspection and maintenance.
5. Heavy-duty bearings used throughout.
6. Long-wearing, precision-cut reduction gearing.
7. Full-length visual scale shows time-cycle in use.
8. Latch-in gear shift assures exact engagement with dial gear.
9. Precision dial with retaining ring—timing keys are locked in position.
10. Dial-contact assembly especially designed for easy maintenance.

Important Features of the Cam Unit

11. Motor-driven for greater flexibility, smoother operation, and longer life.
12. Replaceable cam lobes assure unequalled color sequence and interval flexibility.
13. Fifteen circuits wired complete.
14. Heavy-duty color-circuit contacts rated at 10 amperes, 115 volts.

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Chicago's Bridges

By Donald N. Becker

Chief Structural Engineer—A. J. Boynton & Company, Chicago
Formerly Engineer of Bridge Design—City of Chicago

CHICAGO IS PLAGUED with movable bridges, yet the reason for all these bridges is the very thing that has made Chicago great.

Chicago has two river systems within its boundaries; the Chicago with its two branches and the Calumet.

The Chicago River nearly surrounds the central business district, lying along the north side of the district from its entrance from Lake Michigan to a point about 1.3 miles westward from the lake at which point it divides into two branches, one leading in a northwesterly direction dividing the northerly half of the city and the other leading south past the central business district for about two miles thence turning southwesterly.

The Calumet River starts from Lake Michigan at a point about 12 miles south of the central district and leads southwesterly.

The result is that it has been necessary to build 56 movable bridges over these rivers for highway purposes, more than in any other city in the world. As these bridges must be opened on occasion quite a traffic problem is created. Most people think that modern traffic has its problems but a look into Chicago's past will probably help to console us.

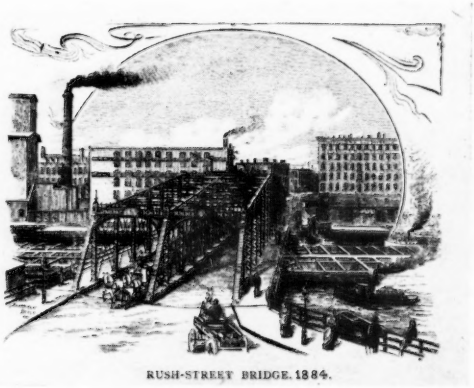
When the early settlers, travelling overland, first reached Chicago they found a sluggish stream not over 100 feet wide, but yet an effective barrier to further progress toward the northwest and west. Accordingly, in 1829 a toll ferry was put in operation near the present Lake Street bridge over the South Branch of the river just south of its junction with the main river leading to the lake. By 1833 this ferry was incapable of accommodating the traffic, especially as the owner and operator, one Mark Beaubien, also operated a tavern on the east bank of the bridge. A crude floating bridge was then thrown across the river. It consisted of rough hewn logs and was capable of being opened so that river traffic, mainly canoes, could pass up and down the river. However, the structure was so crudely built that after three years it was unsafe for traffic but was repaired from time to time until 1840 when it was finally removed.

Chicago's First Drawbridge

In 1834 the first drawbridge was built across the main river at Dearborn Street. It was a structure about 300 feet long with a draw opening of 60 feet, consisting of two leaves that could open like a medieval moat bridge. It proved to be so great an obstruction to navigation and its mechanical operation so precarious that it was removed in 1839.

In 1840 the press of land traffic had grown so great that a bridge at Clark Street, one block west of Dearborn Street, was proposed as evidenced by the following quotation from the Chicago Times in 1840:

"Every night there came out of the south a great fleet of prairie schooners that anchored at the Reservation (Fort Dearborn). It often numbered 500 and came laden with wheat and corn and all sorts of produce. All the warehouses were in that day built on the north bank of the river. The south side opposed the Clark Street bridge in order that these prairie schooners might not reach the warehouses and thus be compelled to trade on the south bank."



RUSH-STREET BRIDGE. 1884.

Fig. 1
Early 3-truss swing span. Size of center pier greatly curtailed usable stream width.

However, the pressure was so great that the bridge was built. It was a sort of pontoon arrangement, to open which, one float was pulled around by means of a chain and windlass.

Another bridge was built at Wells Street two blocks west of Clark Street in 1841 which was replaced in 1847 by a larger bridge. This bridge was described as having a length of 202 feet, with a floating draw of boiler iron drums, with wood stringers supporting a deck which was 100 feet long from the pivot to the opening point, making a clear passageway between fenders of 81 feet. There were two tracks for teams with a sidewalk on each side.

By 1847 two more similar bridges had been built over the South Branch at Randolph Street and at Madison Street. All four of these bridges were swept away in a big flood in March 1849 caused by an ice jam in the Desplaines River, which normally drains into the Illinois River, resulting in its overflowing the divide and running into the Chicago River. Improvised ferries were again resorted to until the bridges were rebuilt during the summer.

An important decision in regard to the rights of land traffic was settled in U. S. District Court in 1850 when the river traffic tried to stop the construction of another bridge, this time at Lake Street. The Court decided "that the right of free navigation is not inconsistent with the right of the State to provide means for crossing the river by bridges or otherwise, when the wants of the public require them."

Traffic Ordinance Passed in 1847

Traffic problems developed in those early days to such an extent that in 1847 an ordinance was passed prohibiting teams from stopping on a bridge or within 40 feet of one. There was also considerable complaint against the performance of their duties by the bridge tenders, who were very lax in opening or closing of bridges when required by either land or water traffic, although, in general, they favored

Fig. 2
Early truss swing span at Adams Street.

the river traffic due to the damage it could inflict if the bridge were not opened promptly.

By 1853 there were eight bridges and in 1852 the bridge tenders were placed under a $500 bond to perform their duties, which amount was increased to $2000 in 1854. So far as is recorded no bridge tender was ever punished for failure to do so.

In 1854 a new type of bridge was built at Clark Street. It was a swing bridge turning on a pivot supported on a pile pier in the river with pile trestle approaches. The trusses were of wood later reinforced with heavy iron plates bolted to the timber members. The bridge contained a double carriageway and two sidewalks. In the following years this type of bridge was improved ultimately using iron trusses and masonry foundations. We moderns think that our automobiles have created problems in the protection of open ends of some of our bridge types, but even 100 years ago this problem existed. Many models and plans for self-acting slides or gates were brought to the attention of the Board of Public Works, all having more or less merit, but still likely, if put in use, to be the cause of more accidents than if omitted. However, the Board offered to permit several inventors of what seemed the most promising devices, the opportunity of installing their inventions at some important bridge with the understanding that it should be paid for only if its merit was proven. No one saw fit to risk his own money.

Such offers have been offered up to the time that the last swing bridge was removed at Clark Street some 20 years ago. One such "inventor" proposed to the City Engineer that the bridge carry a chain across the street when the bridge opened and return it when the bridge closed. The only trouble was that he had not observed that the ends of the bridge did not return to their original position but continued around the circle so as to reduce the time of opening as in this way the end of the bridge could follow the boat as it passed through the draw.

27 Drawbridges in 1870

By 1870 the City had 27 movable bridges. These became an ever increasing obstruction to river traffic and due to their frequent operation a like obstruction to land traffic. As early as the 1850's suggestions were made to tunnel under the river, which became a fact in 1869 with a vehicular tunnel at Washington Street and in 1871 one at LaSalle Street.

The great Chicago Fire of 1871 destroyed eight bridges in the downtown area with the result that the two tunnels served as the only access until new bridges were built within the next year.

Returning again to 1857, the strife between river and street traffic became most acute because of the prodigious increase in marine traffic. By this time the bridges were set high enough to permit tugs and barges to pass under them, especially since tugs were then required to have hinged smoke stacks that could be lowered to preclude necessity for opening the bridges. In 1860 red and green signals were introduced and in 1861 bells were placed on the bridges and in 1867 an ordinance was passed requiring the bridge tenders to have their bridges open not over 10 minutes, which improved conditions materially, but delayed river traffic so that it challenged the ordinance in the Courts but it was upheld.

The period after the fire was filled with more strife between the conflicting interests of water and street traffic, neither seeming to accede to the fact that one would not exist for long without the other at Chicago. There were suggestions that the bridges be opened only at night, even as there are those who now advocate deliveries to stores only at night. Others advocated closed periods of two hours in the morning and again at noon and at evening rush periods.

Probably the crest of river traffic for all time existed during the 1880's. Records show that in 1881 approximately 13,000 vessels arrived and again departed, requiring at least two openings of one or more bridges. In July of 1881 the suggestions of the previous decade finally culminated in the first bridge closing ordinance which kept the bridges closed for one hour at the morning rush period and again in the evening.

In 1883 studies were made of the possibility of creating an outer harbor at which goods could be transferred to barges or lighters so that the bridges could be made fixed. This has never been accomplished and is still being argued even though the number of ships has reduced greatly.

Three-Truss Swing Spans Built

With the continuous increase in traffic in the streets greater roadway widths were demanded. This was accomplished by building swing bridges with three trusses providing a two-lane roadway in each direction with sidewalks on each outside. This greater width required an increase in the size of the center pier because it had to be wide enough to

Fig. 3
Modern "Chicago Type" double leaf trunnion bascule bridge at State Street.

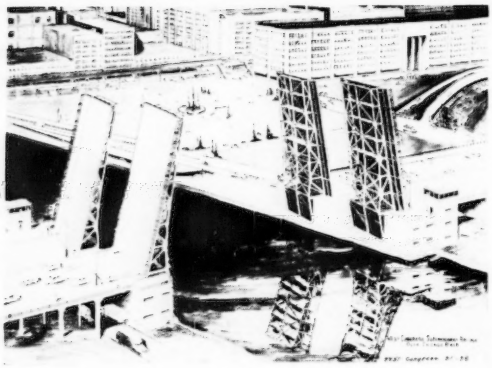


Fig. 4
Twin "Chicago Type" double leaf trunnion bascule bridge at Congress Street.

carry the rollers supporting the outside trusses and with a protective pile and timber structure outside of it to protect the open bridge from the vessels. This resulted in using up about 60 feet of space in the center of the river. A picture (Fig. 1) of one such bridge built at Rush Street in 1884 is shown herewith which may be compared with the accompanying picture (Fig. 2) of the Adams Street bridge built shortly before.

In the decade of 1890-1900 the Sanitary District of Chicago was created with the right to reverse the flow of the Chicago River and divert 10,000 second feet of water from Lake Michigan for sewage dilution and disposal into the Desplaines River. With this large diversion it was necessary to provide a cross section for flow of 4800 square feet to keep the current down to 1¼ miles per hour. With center piers in the river it was difficult to provide this, hence studies were made to find a type of structure, which would not obstruct the river and yet would provide the wider roadways desired.

The City developed what is now called the "Chicago Type" bascule bridge, many examples of which are now seen in Chicago. The Sanitary District replaced several bridges with another type patented by Mr. William Scherzer. These types were built with sufficient opening between masonry or with by-pass to provide the necessary cross section for flow.

In general these bridges in opening provide a barrier across the street which while not a nice thing to run into, yet keeps vehicles from falling into the river.

The bascule bridges of today are probably the best solution for Chicago's traffic problem. If bridges were to be set high enough to clear river traffic as in New York City the approaches would reach out as least a half mile each side of the river which is not practical. If tunnels were used their approaches would reach out about half as far which is, also, not desirable. Either alternate would also cost considerably more than the bascule bridge.

Facilities for Safe Operation Provided

Chicago has developed its bridges so that they may be operated in a minimum of time and are equipped with many safety devices.

They are powered so that they may be opened or closed in from 45 seconds to 1 minute, which, combined with the actual passage of vessels, gives a total time of about 5 minutes per opening.

They are provided with an operator on each side of the river housed in a structure with the operating station high enough so that he can get a good view of all traffic, water, vehicular and pedestrian. These operating stations are placed on opposite sides of the street, if at all possible, so that both sidewalks can be observed to preclude possibility of a pedestrian being trapped on the opening bridge leaves.

Each bridge is equipped with manual bells, electric bells, roadway and sidewalk gates, red flashing lights and a large illuminated "STOP" sign.

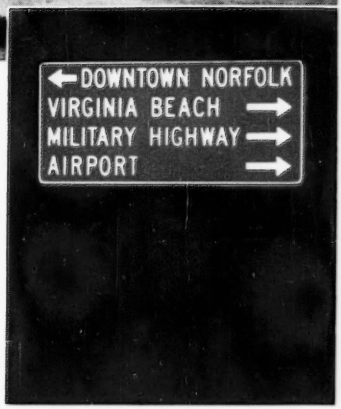
Each bridge is provided with two independent sources of power to minimize outage from power failure. The operators on each side of the river are provided with telephones for ready communication and in some recent bridges with microphones and loudspeakers so they can talk to other parts of the structure without leaving operating positions.

In operation for opening the usual type of bridge the operator first rings a large hand operated bell to warn traffic. He then lowers electric operated railroad type gates across the traffic approaching the bridge, which gates are equipped with flashing red lights and a large electric bell. These lights and bells operate continuously while the gates are lowered. After the traffic has cleared off the bridge another gate is lowered on the off going side. Gates are also lowered across the sidewalks to keep pedestrians back from the bridge. After traffic is thus fully protected the bridge is opened for passage of the vessel after which the reverse process is followed.

There are a few bridges which have a roadway break in such position that the open bridge does not provide a barrier. In these locations a net is lowered across the roadway after the gates are lowered and behind them. This net is attached to friction drums so that in case a vehicle crashes the gate and runs into the net it will pay out against the friction drums and thus stop the vehicle. These are usually adjusted so they will stop a 4000 pound vehicle travelling at 25 miles per hour in about 15 feet which is not likely to cause appreciable damage to vehicle or passengers.

In spite of all precautions that can be taken there are occasional accidents. In one such case a youngster stuck his finger in a small hole in a gate post when the gate was operating and had it cut off. In another a drunk was asleep behind a truss member on the bridge out of sight of the operator and rolled down the bridge when it opened. Frequently gates are broken by a car trying to sneak through. Pedestrians will also run to get across the bridge before it opens, sometimes to wait to see it open.

Fig. 5
Calumet River lift span bridge at Torrence Avenue.



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New Appointment . . .

Kenneth Goodwin McWane, formerly Traffic and Planning Engineer for the Virginia State Highway Department, assumed his duties as Engineer of Traffic and Operations for the Highway Research Board, Washington, D. C., on September 1, 1952. His appointment to succeed Byron A. Bledsoe who resigned the post earlier this year, was announced in August by Fred Burggraf, Director of the Board.

Kenneth Goodwin McWane

The Highway Research Board is organized under the auspices of the Division of Engineering and Industrial Research of the National Research Council, to provide a national clearing house for highway research activities and information. Its membership consists of 42 technical, educational, industrial, and governmental organizations of national scope. Associates of the Board are firms, corporations, and individuals who are interested in highway research and who desire to further its work.

McWane, a native of Lynchburg, Virginia, joined the service of the Virginia Department of Highways in 1921 as an instrumentman in the Lynchburg District. He rose steadily through the ranks of the highway department to serve as Resident Engineer at Suffolk, Orange, and Halifax. He was promoted to the post of Lynchburg District Engineer in 1938, and served in this capacity until elevated to Traffic and Planning Engineer of the highway department in 1948.

While McWane was Traffic and Planning Engineer, Virginia won first place honors in Traffic engineering for each of the three years the award has been given by the Institute of Traffic Engineers in competition among 11 Southeastern states. These states, in addition to Virginia, include North Carolina, Kentucky, West Virginia, Tennessee, Arkansas, Louisiana, Mississippi, Florida, Alabama, and Georgia.

This award is based on outstanding performance in traffic engineering as reported in the annual inventory of traffic safety activities as prepared by the National Safety Council.

An Associate Member of the Institute of Traffic Engineers, McWane represented Virginia in the recent study made by the Highway Planning Commission for Metropolitan Washington, and at present is vice-chairman of the advisory committee to the Virginia Council of Highway Investigation and Research.

He worked closely with the Automotive Safety Foundation, of Washington, in its study last year of Virginia's highway needs during the emergency. This appraisal established a program designed to sustain transportation requirements on the principal roads and streets of Virginia.

A licensed professional highway engineer, McWane is a member of the American Association of State Highway Officials and the Southeastern Association of State Highway Officials. He is a member of the Virginia Citizens Planning Association. He is a steward in the Centenary Methodist Church, a member of the University of Virginia Alumni Association, and a member of the Elks.

He is married to the former Miss Ruth Leon Henson, of Lynchburg. They have one daughter, Mrs. Robert L. Mason, of Gretna, La.

Tinted Glass Approved By All States

Tinted, heat-absorbing glass, now available in most cars, has been approved by motor vehicle administrators throughout the country.

The glass, which filters out glare and heat-producing light rays, has met the safety standards of all 48 states. Exhaustive tests showed that visibility at night through the tinted glass is completely satisfactory.

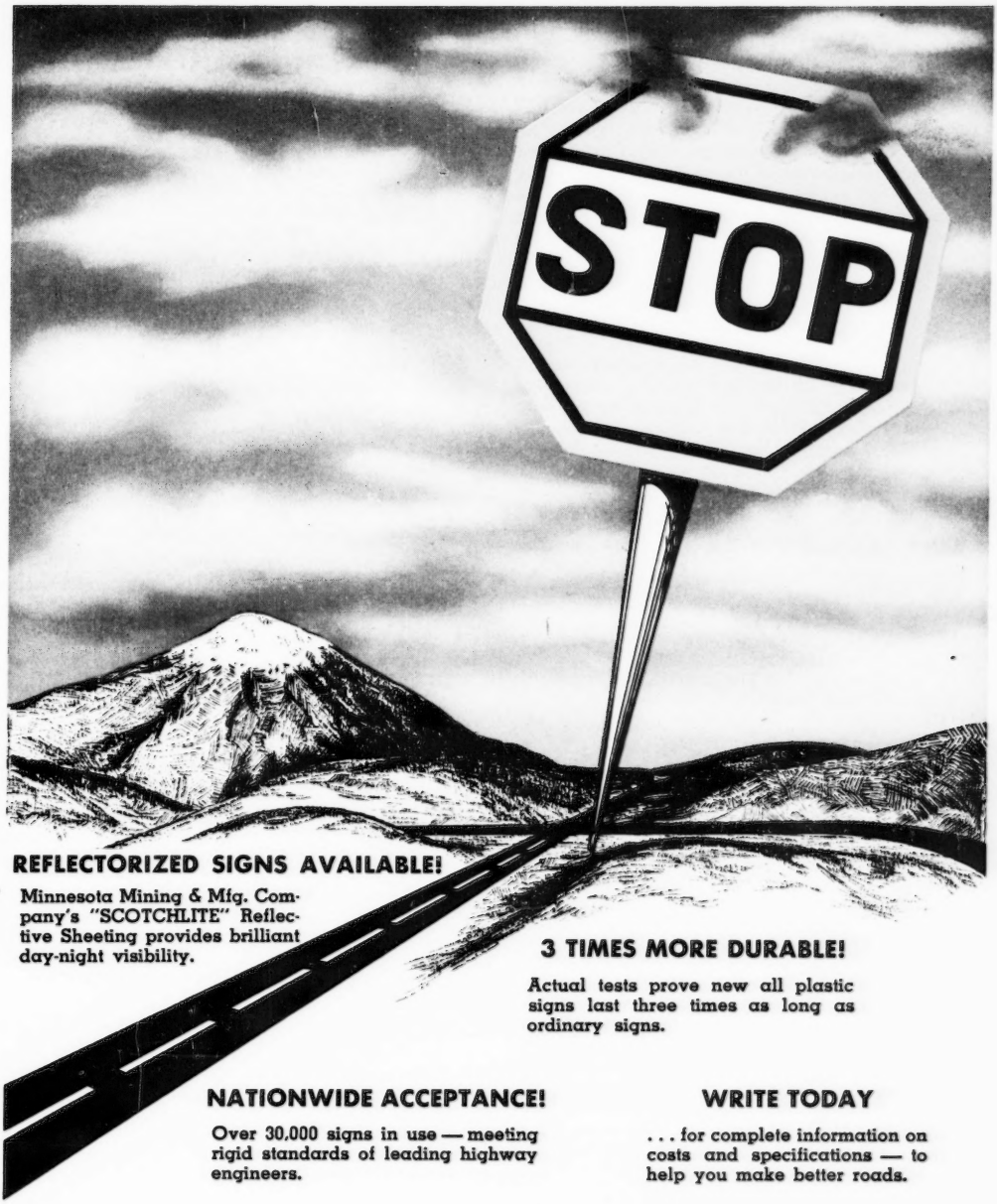
New Plastic Highway Signs Put on Market

A newly developed plastic sign for highway and street use has been put on the market. One of its features is that the background color is built into the base material, thus, eliminating color chipping or peeling when subjected to bending or twisting.

The legends are in accordance with the Manual on Uniform Traffic Control Devices and are raised from ⅛ to ¼ inch above the background surface as is the ribbed border. The embossed portions are painted or dyed with special material that penetrates the plastic about .0025 inches, setting up a unity of legend and background which is claimed to withstand the punishing test of 15 minutes of direct sand blast with #200 grit sand at 36 pounds per square inch at a distance of 6 to 8 inches from the sign, with no appreciable amount of destruction to either the paint or the plastic. Tests made with various caliber gun-fired missiles show that even in case of complete penetration the plastic tends to resume its original form, thereby sealing or partly sealing the hole, and even after many months of weathering there was no indication of surface chipping or flaking around the penetration. They have been tested in standard weatherometers for more than three years without marked change in either the plastic or the paint. The signs have shown no indication of warping under temperature extremes and are not affected by moisture or corrosive agents frequently found in coastal areas.

The plastic signs are manufactured in both plain and reflective types. The material used for the reflectorized style is reflective sheeting. The adhesive quality of the reflective sheeting forms an inseparable bond with the plastic background, and the sheeting cannot be removed without completely destroying the beaded surface, or cutting into the plastic itself.

The new signs are light in weight, thus making installation considerably easier as well as keeping shipping costs at a minimum. Costs of the plastic signs are in the same range as conventional signs. Patent and manufacturing rights are held by the firm of Denver Plastics, Inc., Denver, Colorado, which has already placed some 30,000 plastic signs in field service during the past ten months.



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260 South Dale Court, Denver, Colorado

CHICAGO'S URBAN HIGHWAYS

(Continued from page 444)

public transportation officials, taxi cab representatives, sponsors of the event and others to discuss all conditions incidental to that event. Special routings and parking facilities are planned and informative bulletins are issued. The resulting coordination of all public transportation facilities together with the traffic arrangements, both vehicular and pedestrian, eliminates much of the confusion and aggravation which the public had experienced prior to the adoption of this type of planning, originated by the Park District. As the great multitudes are accommodated by traffic planning so is the individual yachtsman and participant in smaller scale activities provided for in the comprehensive traffic plan. The goal of maintaining beauty and healthful recreation is not sacrificed to a haste for bare efficiency.

The urban highways are a landmark of the City of Chicago, just as Paris, London and Berlin are identified by their boulevard systems. Chicago's boulevards have great utility and recreational value; they extend parks into communities and neighborhoods and maintain a proper scale for trees, shrubs and floral treatments. The boulevards are designed essentially for the private citizen's use and are relatively free of commercialism; with their monuments, squares and famous water front, they are the picture postcard show routes of the City.

COOK COUNTY EXPRESSWAY PLAN

(Continued from page 449)

Fig. 4
Merging ramp "Yield" sign.

the expressway without stopping. The experience to date with this type of traffic control has been very favorable.

The opening to traffic of the first sections of the expressway system made necessary various legal and jurisdictional adjustments. Most important was the changing of the maximum posted speed limit to 60 miles per hour and a general absorption of all policing jurisdiction on the expressway and ramp pavements by the State of Illinois.

Policing, accident reporting and the like on rural roads are the responsibilities of the villages through which the roads pass, with those functions being served by the County and State police in unincorporate areas. This system when applied to the expressway is complicated and practically unworkable.

The Division of Highways of the State of Illinois which will operate the expressway system has appointed an expressway engineer. Under the administration of this engineer will be various subordinates—a director of maintenance, traffic engineer and the like. In such a way coordination of all the various phases of the operation of the roadways—the relationship between accidents and maintenance, policing and signing, etc.,—will be most readily obtained.

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NO U TURN
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NO PARKING ANY TIME
NO RIGHT TURN

The Chicago Park District, like many progressive municipalities, selects porcelain enamel on steel for durable traffic signs. Perhaps one of the most important reasons why porcelain is selected is because of the almost total elimination of maintenance. A recent comparison of road sign costs in four leading states shows that California, having used porcelain enameled signs since 1911, saves approximately $325,000 per year, figured on a cost per mile basis. You can save too!

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ON THE SHELF

Editor's Note: *Mrs. Kathryn Cassidy, Librarian, Yale Bureau of Highway Traffic,* who has been compiling the On the Shelf material so ably since 1950 is taking a year's leave to accompany her husband during his travels in connection with his research as a recipient of a Ford Foundation Fellowship. During her absence Mrs. Kagan has generously consented to compile On the Shelf.

Compiled by Mrs. Cele Kagan
Acting Librarian

Oklahoma. University of. Extension Division and the Institute of Community Development.

Proceedings, Community Development Conference, October 25-26, 1950. The University, 1950. 98p., mimeo.

Articles on methods and procedures of city planning, establishment and operation of a planning commission, planning of public utilities, provision for recreation and public health, budgeting, housing, traffic, etc.

Oregon State Highway Department, Traffic Engineering Division, Planning Survey Section.

A Study of Truck Loading Practice, August, 1950. The Division, 1951. In cooperation with the U. S. Bureau of Public Roads.

A study during the period from August 8 to September 1 of truck volumes and loading practices made in order to accumulate data "to determine the weights and weight distributions of commercial vehicles and the extent of excessive axle and gross loads."

Owen, Wilfred.

Automobile Transportation in Defense or War; a Report Prepared for the Defense Transport Administration. Superintendent of Documents, U. S. Government Printing Office. 1951. 25c.

A study by Mr. Owen of the Brookings Institution designed to estimate as accurately as possible: 1. How many passenger cars would have to be kept in operation if war compelled us to eliminate all but the most essential automobile transportation services?; 2. What requirements would have to be met to keep cars in operation under conditions of national emergency?; 3. What is the most desirable policy with respect to the production of automobiles in a defense production period or general war? The study is preliminary in the sense that it does not represent policies or final conclusions on the part of the Defense Transport Administration, but it was prompted by the recognition that two conflicting and important needs will develop acutely in the event of either general war or a prolonged period of large defense production; the continued need for private automobiles as a primary method of transportation to and from places of employment and the conflicting need for the space, material and knowledge of the automobile manufacturing concerns for the production of other equipment. This report presents data upon which a resolution of those conflicts might be resolved and presents some conclusions.

Paterson, New Jersey, Planning Board.

Report on Land Use. The Board, 1950. 27p.

The second of a series of reports in the "analysis of the significant phases of urban growth as a prerequisite to sound planning." The first was on blighted areas. Studies on traffic and transportation and on economics are to follow.

Texas Highway Department.

Lubbock Origin and Destination Survey. The Department, 1950. 11 maps, 10 tables.

An external origin and destination survey, made with the cooperation of the Bureau of Public Roads and the City of Lubbock.

U. S. Bureau of Public Roads

A Bibliography of Highway Planning Reports; Compiled in the Library of the Bureau of Public Roads. U. S. Government Printing Office, 1950. 30c. 48pp.

A comprehensive list of highway planning and related reports issued from 1930 to April, 1950.

U. S. Bureau of Public Roads

A Factual Discussion of Motortruck Operation, Regulation, and Taxation; a Statement Submitted to the Subcommittee on Domestic Land and Water Transportation of the Committee on Interstate and Foreign Commerce, United States Senate, by Thomas H. MacDonald, Commissioner Bureau of Public Roads. . . . June 1950. U. S. Government Printing Office, 1951. 30c.

Contents: Part I. Growth of Motor-Vehicle Registration and Use; Part II. Effects of Size and Weight of Vehicles on the Geometric Design and Traffic Capacity of Highways; Part III. Axle Loading—Its Effect on Roads and Legal Limitation; Part IV. Weight of Vehicles and Its Effect on Bridges; Part V. Character of Overloaded Vehicles and Their Pay Loads; Part VI. Highway-User Tax Payments in Relation to Highway Revenues and Expenditures; Part VII. Allocation of Highway Tax Responsibility.

Obituary

Walter A. Spratt of Long Beach, New York, Traffic Consultant to Long Beach; Associate Member of the Institute, died suddenly after a brief illness in the Long Beach City Hospital July 30, 1952.

Born in New York City, January 15, 1883, Mr. Spratt was for many years Traffic Engineer for the Welsback Traffic Signal Company of Philadelphia. He was responsible for all traffic operations, including survey, analysis and recommendation for the use, placement and operation of traffic control devices furnished by his company. During his long career he won many friends throughout the southeastern section of the country by providing unbiased advice and traffic engineering services to a great many municipalities and counties of that area.

In 1946 when the Welsback Company was dissolved he entered the consulting field. He was elected to membership in the Institute in 1947.

His wife preceded him in death several years ago and his only immediate survivor is a brother residing in Brooklyn.

LOCAL TRANSIT IN CHICAGO

(Continued from page 463)

be used for modernization purposes only.

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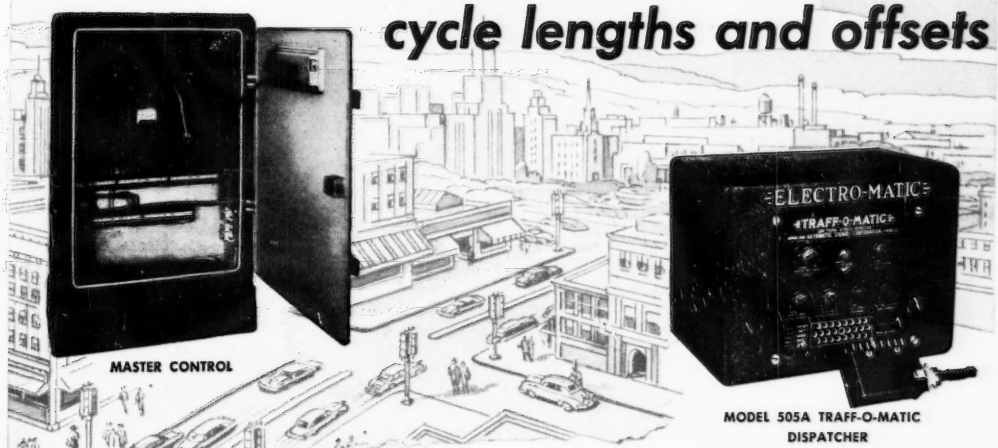

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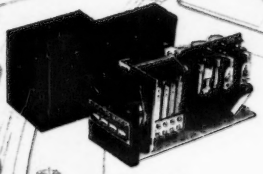

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Sampling detectors at a key location on the arterial street send to the Master Control a continuous picture of changes in traffic volume. The Master Control unerringly selects the most effective background cycle length for the semi-actuated controllers in the system and smoothly makes it effective through local offset units which operate with the semi-actuated controller at each intersection.

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LOOKING AHEAD

SEPTEMBER 20-24, 1952—ATLANTIC CITY, N. J.
Annual Meeting, American Transit Association.

SEPTEMBER 21-25, 1952—LOS ANGELES, CALIF.
International Association of Chiefs of Police, Biltmore Hotel.

SEPTEMBER 28-OCTOBER 2, 1952—KANSAS CITY, MISSOURI
International City Managers Assn.

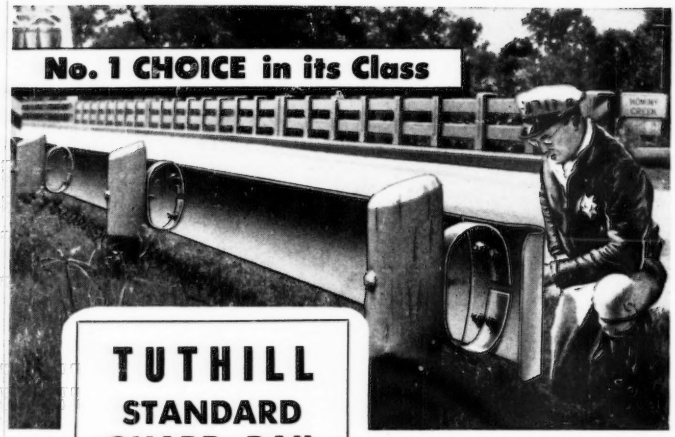
SEPTEMBER 29-OCTOBER 2, 1952—BOSTON, MASSACHUSETTS
Annual Convention, International Municipal Signal Assn., Inc., Hotel Statler.

OCTOBER 5-8, 1952—BOSTON, MASSACHUSETTS
American Society of Planning Officials, Copley-Plaza Hotel.

OCTOBER 6-10, 1952—NEW YORK CITY
American Trucking Association—18th Annual Convention, Waldorf-Astoria Hotel.

OCTOBER 17-18, 1952—CHICAGO, ILLINOIS
The President's Highway Safety Conference.

OCTOBER 20-24, 1952—CHICAGO, ILLINOIS
40th National Safety Congress and Exposition of the National Safety Council.



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ONE-WAY STREETS IN CHICAGO'S LOOP

(Continued from page 455)

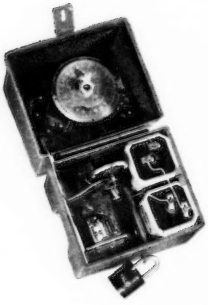
other traffic in approximately 200 feet to make a left turn into Michigan Avenue. At Randolph and Canal a similar condition existed because the buses had to use the left half of the subway under the Northwestern Station to make a left turn into Clinton Street. Experimental loading zones were installed in the left half of the street. In both cases a 4 foot safety zone was painted to provide a 10 foot bus lane at the left curb. The acceptance and use of these unorthodox safety zones has relieved two points of serious congestion. To further reduce weaving movement of buses the safty zone on Randolph at Wabash was placed in the center of the street, thus allowing two blocks for weaving from the right curb lane to the left curb lane.

The changeover from two-way to one-way operation was effected smoothly through the cooperation of all interested agencies. The Chicago newspapers and radio stations gave the system wide publicity in advance of and during the changeover. The Chicago Police Department increased the Loop Traffic detail to 200 men. The courtesy and understanding of the police contributed much to the favorable acceptance by the public.

The main question now being asked by many is, "Why not north-south one-way streets in the "Loop?" The answer is that considerable study is being and has been given to the problem and it is hoped that at least one pair of north-south streets can be put in operation shortly.

PERIOD COUNTER

The Period Control Traficounter (model PC) is a portable, automatic counter designed for use with a pneumatic type road tube. The special feature of this model is its ability to receive counts during any portion or period of the day.



It may be turned on and off automatically at predetermined intervals. Thus a set of *Period Control Traficounters* may be correlated by a single operator and readings taken at any convenient time.

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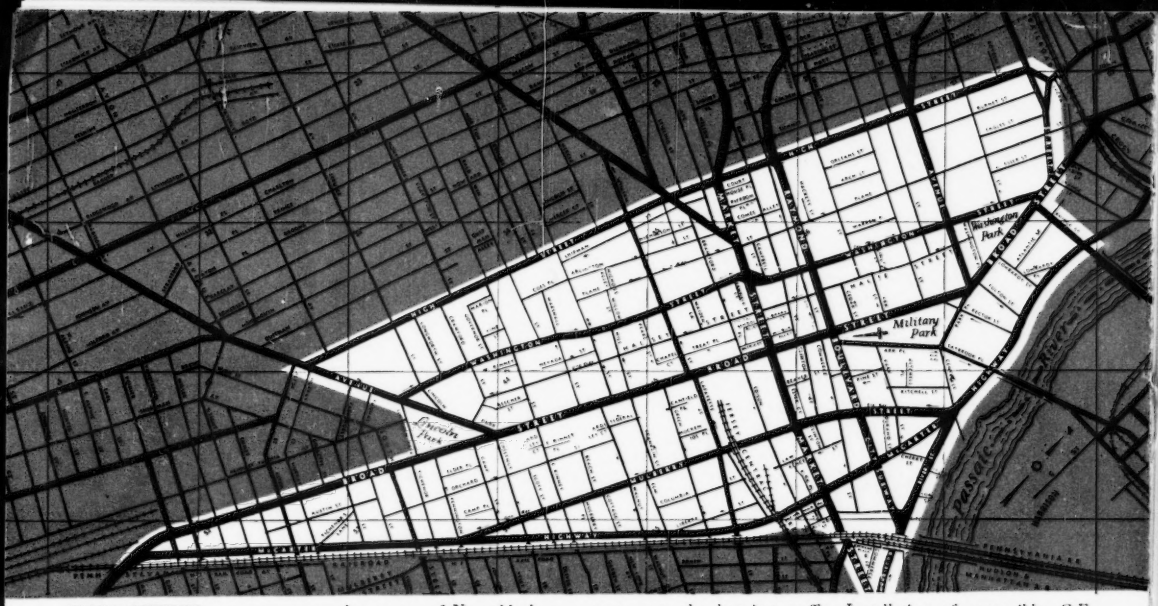


MAIN ARTERIES converge upon the center of Newark's busy downtown section. The white area, now controlled by G-E equipment, gets the heaviest traffic. Installation of expansible G-E Type F traffic controllers has prepared city for future traffic growth.

Newark, N. J. moves heavy traffic with expansible G-E controllers

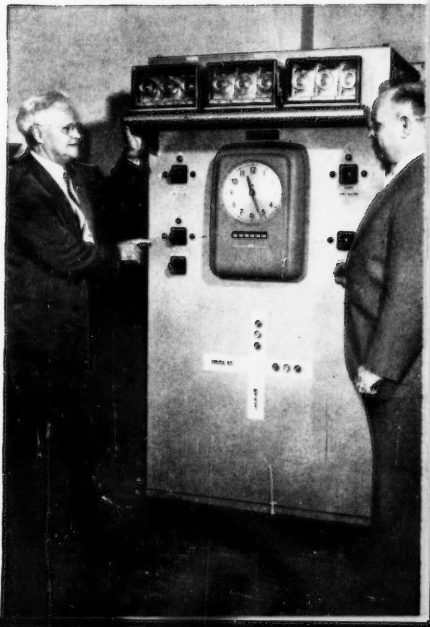
The center of activity of a rapidly growing population now over 1¼ million, downtown Newark's traffic burden was becoming unbearable. Extremely heavy commuter and through traffic funnels daily into this area in the morning and explodes outward at night. Peak counts jumped 75% in just twenty years.

Now, a modern interconnected traffic-control system, using flexible G-E equipment throughout, provides orderly, progressive movement for all traffic conditions.

Says Mr. E. L. Cyr, Newark's Traffic Engineer, "G-E equipment enables us to control 20th-century traffic on our 18th-century layout of streets. Because it is expansible, we'll keep up with traffic growth for many years to come."

Whatever your traffic problem is, Newark's complex problem shows that you can solve it with G-E traffic control equipment. Ask your local G-E Apparatus Sales Office or authorized distributor, or write for Bulletin GEA-5481. Address *Section 453-58A, General Electric Co., Schenectady 5, N. Y.*

HEART OF SYSTEM is G-E central control panel. Discussing progressive-timing control are Newark's Public Safety Director J. B. Keenan, at left, and Traffic Engineer E. L. Cyr.



GENERAL ELECTRIC

TRAFFIC FLOW is speeded by G-E equipment at busy, complicated intersection. Progressive timing keeps traffic moving and allows pedestrians ample time to cross.

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